Controls – Contactors and Contactor Assemblies

3

Introduction

Overview



Size			**S00**			**S0**				**S2**		
Type			3RT10 1			3RT10 2				3RT10 3		
3RT10 contactors • 3RT12 and 3TF68/69 vacuum contactors												
Type AC, DC operation			**3RT10 15**	**3RT10 16**	**3RT10 17**	**3RT10 23**	**3RT10 24**	**3RT10 25**	**3RT10 26**	**3RT10 34**	**3RT10 35**	**3RT10 36**
Type			--			--				--		
A-3												
I_e/AC-3/400 V		A	7	9	12	9	12	17	25	32	40	50
400 V		**kW**	**3**	**4**	**5.5**	**4**	**5.5**	**7.5**	**11**	**15**	**18.5**	**22**
230 V		kW	2.2	3	3	3	3	4	5.5	7.5	11	15
500 V		kW	3.5	4.5	5.5	4.5	7.5	10	11	18.5	22	30
690 V	3RT10/12	kW	4	5.5	5.5	5.5	7.5	11	11	18.5	22	22
1 000 V	3RT10/12	kW	--	--	--	--	--	--	--	--	--	--
AC-4 (for I_a = 6 x I_e)												
400 V		**kW**	**3**	**4**	**4**	**4**	**5.5**	**7.5**	**7.5**	**15**	**18.5**	**22**
400 V (200 000 operating cycles)	3RT10/12	kW	1.15	2	2	2	2.6	3.5	4.4	8.2	9.5	12.6
AC-1 (40 °C, ≤ 690 V)												
I_e	3RT10/12	**A**	**18**	**22**	**22**	**40**	**40**	**40**	**40**	**50**	**60**	**60**
3RT14 AC-1 contactors												
Type			**--**			**--**				**--**		
I_e/AC-1/40 °C/≤ 690 V		**A**	**--**			**--**				**--**		
Accessories for contactors												
Auxiliary switch blocks	front lateral		**3RH19 11** **--**			**3RH19 21** **3RH19 21**						
Terminal covers			**--**			**--**				**3RT19 36-4EA2**		
Box terminal blocks			**--**			**--**				**--**		
Surge suppressors			**3RT19 16**			**3RT19 26**				**3RT19 26/36**		
3RU11 and 3RB20/21 overload relays (protection equipment: overload relays)												
3RU11, thermal, CLASS 10			**3RU11 16** 0.1 ... 12 A			**3RU11 26** 1.8 ... 25 A				**3RU11 36** 5.5 ... 50 A		
3RB20/21, solid-state, CLASS 5, 10, 20 and 30			**3RB20 16** 0.1 ... 12 A **3RB21 16**			**3RB20 26** 3 ... 25 A **3RB21 26**				**3RB20 36** 6 ... 50 A **3RB21 36**		
3RB22/23, solid-state, CLASS 5, 10, 20 and 30			**3RB2. 83 + 3RB29 06** 0.3 ... 25 A							**3RB2. 83 + 3RB29 06** 10 ... 100 A		
3RV10 motor starter protectors (protection equipment: circuit-breakers)												
Type			**3RV10 11** 0.18 ... 12 A			**3RV10 21** 9 ... 25 A				**3RV10 31** 22 ... 50 A		
Link modules			**3RA19 11**			**3RA19 21**				**3RA19 31**		
3RA13 reversing contactor assemblies												
Complete units	Type		**3RA13 15**	**3RA13 16**	**3RA13 17**		**3RA13 24**	**3RA13 25**	**3RA13 26**	**3RA13 34**	**3RA13 35**	**3RA13 36**
400 V		**kW**	**3**	**4**	**5.5**		**5.5**	**7.5**	**11**	**15**	**18.5**	**22**
Installation kits/wiring connectors			**3RA19 13-2A**			**3RA19 23-2A**				**3RA19 33-2A**		
Mechanical interlocks			**3RA19 12-2H**			**3RA19 24-1A/-2B**						
3RA14 contactor assemblies for wye-delta starting												
Complete units	Type		**3RA14 15**	**3RA14 16**		**3RA14 23**		**3RA14 25**		**3RA14 34**	**3RA14 35**	**3RA14 36**
400 V		**kW**	**5.5**	**7.5**		**11**		**15/18.5**		**22/30**	**37**	**45**
Installation kits/wiring connectors			**3RA19 13-2B**			**3RA19 23-2B**				**3RA19 33-2B/-2C**		



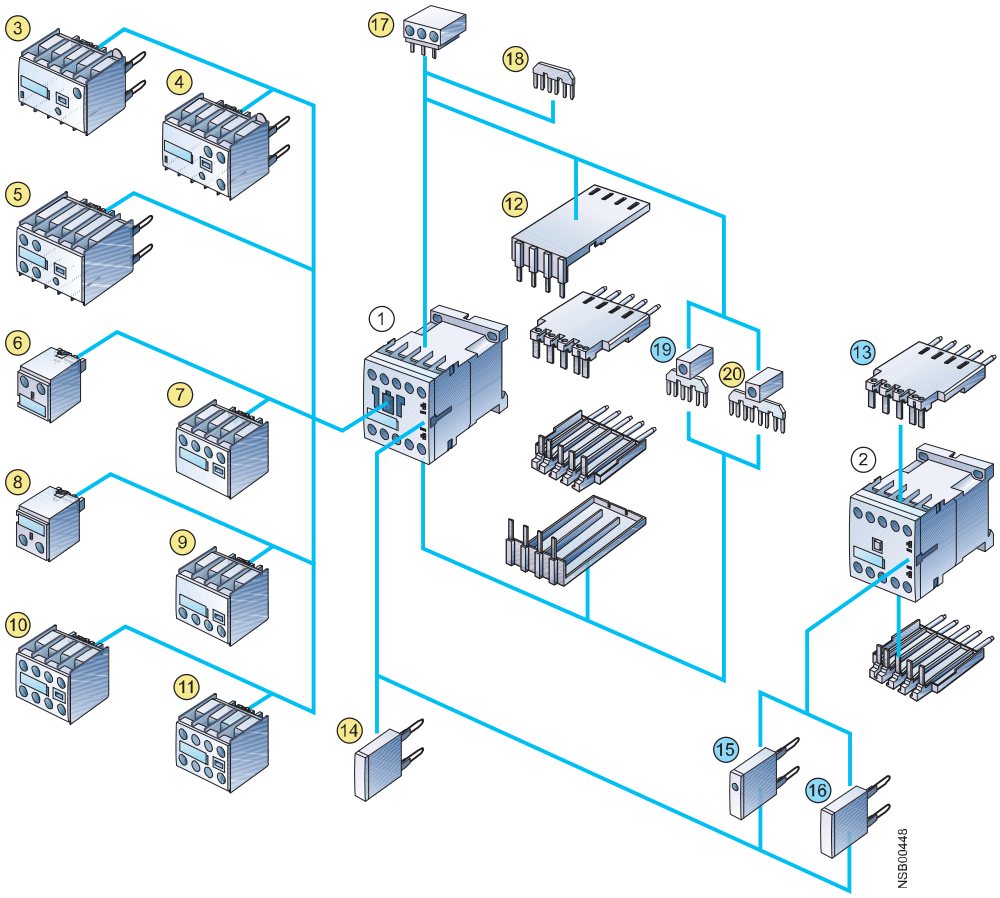

	S3 3RT1. 4			S6 3RT1. 5			S10 3RT1. 6			S12 3RT1. 7		14 3TF6	
	3RT10 44	**3RT10 45**	**3RT10 46**	**3RT10 54**	**3RT10 55**	**3RT10 56**	**3RT10 64**	**3RT10 65**	**3RT10 66**	**3RT10 75**	**3RT10 76**	**--**	
	--			--			**3RT12 64**	**3RT12 65**	**3RT12 66**	**3RT12 75**	**3RT12 76**	**3TF68**	**3TF69**
	65	80	95	115	150	185	225	265	300	400	500	630	820
	30	**37**	**45**	**55**	**75**	**90**	**110**	**132**	**160**	**200**	**250**	**335**	**450**
	18.5	22	22	37	45	55	55	75	90	132	160	200	260
	37	45	55	75	90	110	160	160	200	250	355	434	600
	45	55	55	110	132	160	200	250	250	400	400/500	600	800
	30	37	37	75	90	90	90/315	132/355	132/400	250/560	250/710	600	800
	30	**37**	**45**	**55**	**75**	**90**	**110**	**132**	**160**	**200**	**250**	**355**	**400**
	15.1	17.9	22	29	38	45	54/78	66/93	71/112	84/140	98/161	168	191
	100	**120**	**120**	**160**	**185**	**215**	**275/330**	**330**	**330**	**430/610**	**610**	**700**	**910**
	3RT14 46			**3RT14 56**			**3RT14 66**			**3RT14 76**		**--**	
	140			**275**			**400**			**690**		**--**	
												-- **3TY7 561**	
	3RT19 46-4EA1/2			**3RT19 56-4EA1/2/3**			**3RT19 66-4EA1/2/3**					**3TX7 686/696**	
	--			**3RT19 55/56-4G**			**3RT19 66-4G**					**--**	
				3RT19 56-1C (RC element)								**3TX7 572**	
	3RU11 46 18 ... 100 A			**--**			**--**			**--**		**--**	
	3RB20 46 12.5 ... 100 A **3RB21 46**			**3RB20 56** 50 ... 200 A **3RB21 56**			**3RB20 66** 55 ... 630 A **3RB21 66**			**3RB20 66** 160 ... 630 A **3RB21 66**		**3RB20 66** 160 ... 630 A **3RB21 66**	
				3RB2. 83 + 3RB29 56 20 ... 200 A			**3RB2. 83 + 3RB29 66** 63 ... 630 A						
	3RV10 41 45 ... 100 A			**--**			**--**			**--**		**--**	
	3RA19 41			**--**			**--**			**--**		**--**	
	3RA13 44	**3RA13 45**	**3RA13 46**	**--**			**--**			**--**		**3TD68 04**	
	30	**37**	**45**	**55**	**75**	**90**	**110**	**132**	**160**	**200**	**250**	**335**	
	3RA19 43-2A			**3RA19 53-2A**			**3RA19 63-2A**			**3RA19 73-2A**		**3TX7 680-1A**	
				3RA19 54-2A								**3TX7 686-1A**	
	3RA14 44	**3RA14 45**		**--**			**--**			**--**		**3TE68 04**	
	55	**75**		**--**			**--**			**--**		**630**	
	3RA19 43-2B/-2C			**3RA19 53-2B**			**3RA19 63-2B**			**3RA19 73-2B**		**3TX7 680-1B**	

General data

Overview

3RT1 contactors and coupling relays
Size S00 with mountable accessories

The SIRIUS generation of controls is a complete, modular system family, logically designed right down to the last detail, from the basic units to the accessories.

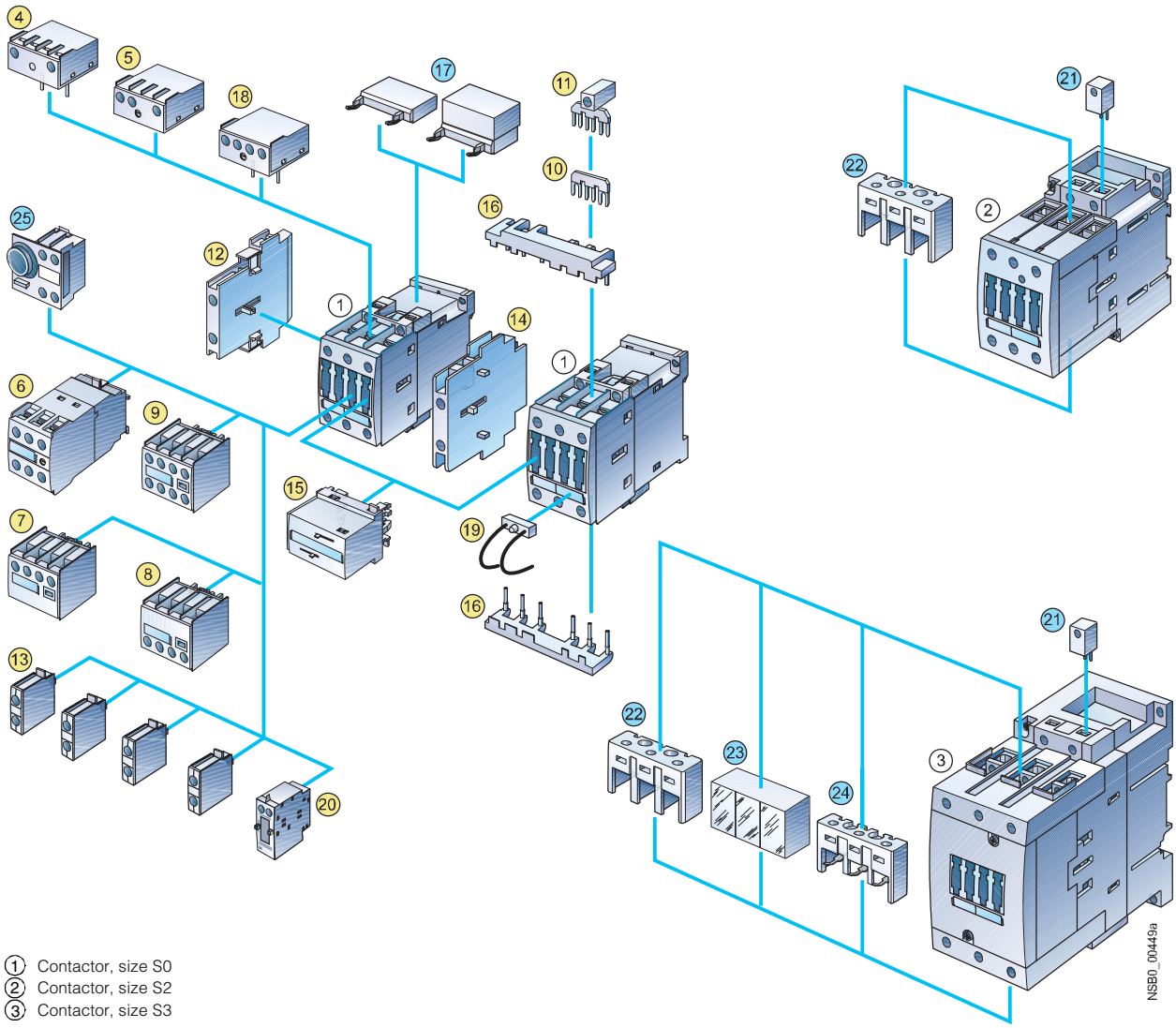


1 Contactor
2 Coupling relay
3 Solid-state time-delay block with ON-delay
4 Solid-state time-delay block with OFF-delay
5 Auxiliary switch block with solid-state time delay (ON or OFF-delay or wye-delta function)
6 Single-pole auxiliary switch block, cable entry from above
7 2-pole auxiliary switch block, cable entry from above
8 Single-pole auxiliary switch block, cable entry from below
9 2-pole auxiliary switch block, cable entry from below
10 4-pole auxiliary switch block (terminal designation according to EN 50012 or EN 50005)
11 2-pole auxiliary switch block, standard version or solid-state compatible design (terminal designations according to EN 50005)
12 Solder pin adapter for contactors with 4-pole auxiliary switch block
13 Solder pin adapter for contactors and coupling relays
14 Additional load module for increasing the permissible residual current
15 Surge suppressor with LED
16 Surge suppressor without LED
17 3-phase feed-in terminal
18 Link for paralleling (star jumper), 3-pole, without connection terminal
19 Links for paralleling, 3-pole, with connection terminal
20 Links for paralleling, 4-pole, with connection terminal

For contactors
For contactors and coupling relays (interface)

For contactor assemblies see pages 3/82 to 3/83.
For assembly kit for reversing contactor assemblies (mech. interlocking, wiring modules) see Catalog LV 1.
For mountable overload relays see Protection Equipment: Overload Relays
For fuseless load feeders, see Load Feeders, Motor Starters and Soft Starters -> 3RA Fuseless Load Feeders

3RT1 contactors
Sizes S0 to S3 with mountable accessories



(1) Contactor, size S0
(2) Contactor, size S2
(3) Contactor, size S3

For sizes S0 to S3:

(4) Solid-state time-delay block with ON-delay
(5) Solid-state time-delay block with OFF-delay
(6) Auxiliary switch block with solid-state time delay (ON or OFF-delay or wye-delta function)
(7) 2-pole auxiliary switch block, cable entry from above
(8) 2-pole auxiliary switch block, cable entry from below
(9) 4-pole auxiliary switch block (terminal designation according to EN 50012 or EN 50005)
(10) Link for paralleling (star jumper), 3-pole, without connection terminal
(11) Links for paralleling, 3-pole, with connection terminal
(12) 2-pole auxiliary switch block, laterally mountable left or right (terminal designation according to EN 50012 or EN 50005)
(13) Single-pole auxiliary switch block (up to 4 can be snapped on)
(14) Mechanical interlock, laterally mountable
(15) Mechanical interlock, mountable on the front
(16) Wiring connectors on the top and bottom (reversing duty)
(17) Surge suppressor (varistor, RC element, diode assembly), can be mounted on the top or bottom (different for S0 and S2/S3)
(18) Coupling link for mounting directly to contactor coil
(19) LED module for indicating contactor operation

Only for size S0:

(25) Pneumatic delay block

Only for sizes S0 and S2:

(20) Mechanical latching

Only for sizes S2 and S3:

(21) Repeat coil terminal for making contactor assemblies
(22) Terminal cover for box terminal

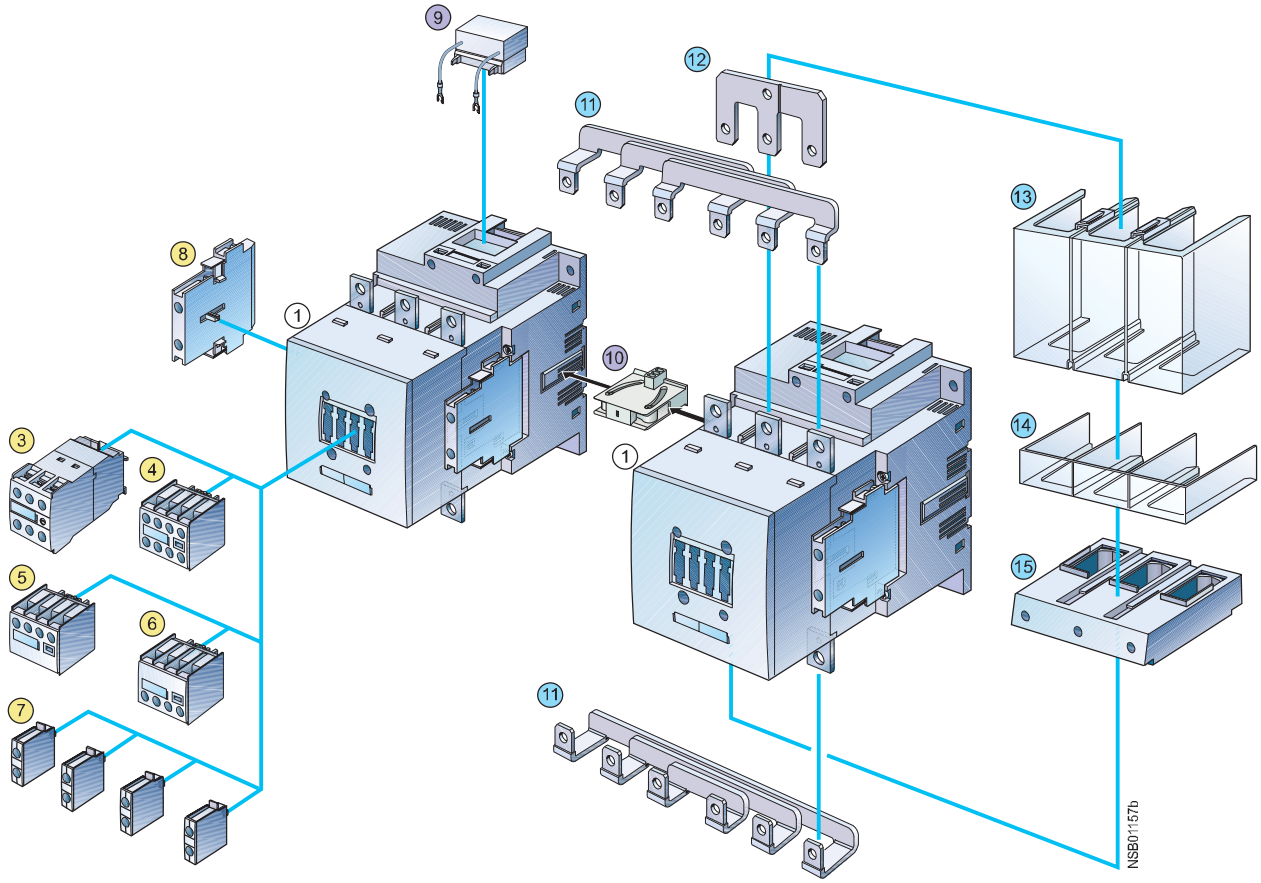
Only for size S3:

(23) Terminal cover for cable lug and bar connection
(24) Auxiliary terminals, 3-pole

Accessories identical for sizes S0 to S3
Accessories differ according to size

General data

3RT1 contactors
Sizes S6 to S12 with accessories

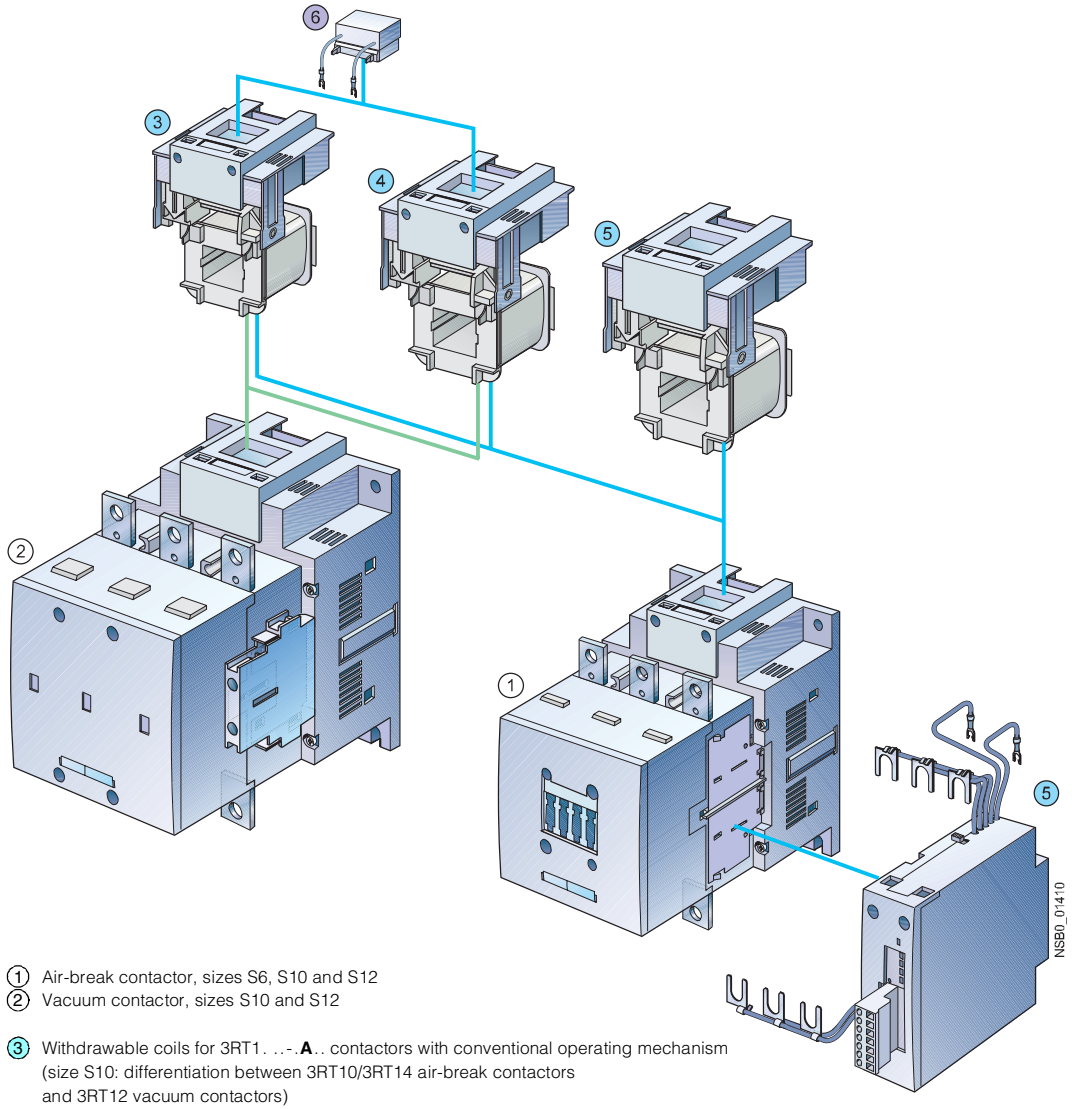


(1) 3RT10 and 3RT14 air-break contactors, sizes S6, S10 and S12

(3) Auxiliary switch block with solid-state time delay (ON or OFF-delay or wye-delta function)
(4) 4-pole auxiliary switch block (terminal designation according to EN 50012 or EN 50005)
(5) 2-pole auxiliary switch block, cable entry from above
(6) 2-pole auxiliary switch block, cable entry from below
(7) Single-pole auxiliary switch block (up to 4 can be snapped on)
(8) 2-pole auxiliary switch block, laterally mountable left or right (terminal designation according to EN 50012 or EN 50005)
(9) Surge suppressor (RC element), for plugging into top of withdrawable coil
(10) Mechanical interlock, laterally mountable
(11) Wiring connectors on the top and bottom (reversing duty)
(12) Link for paralleling (star jumper), 3-pole, with through hole, different for sizes S6 and S10/S12
(13) Terminal cover for cable lug and busbar connection, different for sizes S6 and S10/S12
(14) Terminal cover for box terminal, different for sizes S6 and S10/S12
(15) Box terminal block, different for sizes S6 and S10/S12

Accessories identical for sizes S0 to S12
Accessories identical for sizes S6 to S12
Accessories differ according to size

For mountable overload relays see Protection Equipment: Overload Relays



(1) Air-break contactor, sizes S6, S10 and S12
(2) Vacuum contactor, sizes S10 and S12

(3) Withdrawable coils for 3RT1. ..-.**A**.. contactors with conventional operating mechanism
(size S10: differentiation between 3RT10/3RT14 air-break contactors
and 3RT12 vacuum contactors)
(size S12: the same for air-break and vacuum contactors)
(4) Withdrawable coils for 3RT1. ..-.**N**.. contactors with solid-state operating mechanism.
(size S10: differentiation between 3RT10/3RT14 air-break contactors
and 3RT12 vacuum contactors)
(size S12: the same for air-break and vacuum contactors)
(5) Withdrawable coils and laterally mountable module (plug-on) for 3RT1. ..-.**P**.. and 3RT1. ..-.**Q**..
air-break contactors with solid-state operating mechanism and remaining lifetime indicator.
(6) Surge suppressor (RC element), plug-mountable on withdrawable coils
- 3RT1. ..-.**A**.. with conventional operating mechanism.
- 3RT1. ..-.**N**.. with solid-state operating mechanism.

Identical for sizes S6 to S12
Different according to size

For mountable overload relays see Protection Equipment:
Overload Relays

3RT10 contactors, 3-pole, 3 ... 250 kW

Overview

3RT10 contactors, 3-pole, sizes S00 to S3, up to 45 kW

AC and DC operation

IEC 60947, EN 60947 (VDE 0660)

The 3RT1 contactors are climate-proof. They are finger-safe according to EN 50274.

The 3RT1 contactors are available with screw terminals or with Cage Clamp terminals.

Size S00 contactors have an auxiliary contact integrated in the basic unit. The basic units of sizes S0 to S3 contain only the main circuits.

All basic units can be extended with auxiliary switch blocks. For size S0 and higher, complete units with 2 NO + 2 NC are available (connection designation according to EN 50012). The auxiliary switch block can be removed *(for more information see Integration).*

In addition, complete units with permanently mounted auxiliary switch block (2 NO + 2 NC according to EN 50012) are offered for sizes S00 and S0. These versions are built according to special Swiss regulations "SUVA" and are distinguished externally by a red identification plate.

The size S3 contactors have removable box terminals for the main conductor connections. This permits connection of ring terminal lugs or busbars.

Contact reliability

If voltages ≤ 110 V and currents ≤ 100 mA are to be switched, the auxiliary contacts of the 3RT1 contactor or 3RH11 contactor relay should be used as they guarantee a high level of contact reliability.

These auxiliary contacts are suitable for electronic circuits with currents ≥ 1 mA at a voltage of 17 V.

Short circuit protection of the contactors

For more information about short circuit protection of contactors without overload relay, see Technical Specifications. For more information about short circuit protection of the contactors with overload relay, see "Overload Relays". When installing fuseless motor feeders, the combinations of circuit-breakers and contactors described under "Fuseless Load Feeders" must be used.

Motor protection

3RU11 thermal overload relays or 3RB20 solid-state overload relays can be fitted to the 3RT1 contactors for protection against overload. The overload relays must be ordered separately.

Overvoltage damping

3RT1 contactors can be retrofitted with RC elements, varistors, diodes or diode assemblies (assembly of diode and Zener diode for short break times) for supressing opening surges in the coil.

The surge suppressors are plugged onto the front of size S00 contactors. Space is provided for them next to a snap-on auxiliary switch block.

For size S0 to S3 contactors, varistors and RC elements can be snapped on either on the top or directly below the coil connections. Diode assemblies are available in 2 different versions on account of their polarity. Depending on the application they can be connected either only at the bottom (assembly with circuit-breaker) or only at the top (assembly with overload relay).

The plug-in direction of the diodes and diode assemblies is specified by coding.
Exceptions:
3RT19 26-1T.00 and
3RT19 36-1T.00; in this case the plug-in direction is marked with "+" and "-".

Coupling relays are supplied either without overvoltage damping or with a varistor or diode connected as standard, according to the version.

Note:
The OFF-delay times of the NO contacts and the ON-delay times of the NC contacts increase if the contactor coils are damped against voltage peaks (noise suppression diode 6 to 10 times; diode assemblies 2 to 6 times, varistor +2 to 5 ms).

3RT10 contactors, 3-pole, sizes S6 to S12, > 45 to 250 kW

- 3RT10, contactors for switching motors,
- 3RT12, vacuum contactors for switching motors,
- 3RT14, contactors for AC-1 applications.

Operating mechanism types

Two types of solenoid operation are available:

- Conventional operating mechanism
- Solid-state operating mechanism (with 3 performance levels)

UC operation

The contactors can be operated with AC (40 to 60 Hz) as well as with DC.

Withdrawable coils

For simple coil replacement, e.g. if the application is replaced, the magnetic coil can be pulled out upwards after the release mechanism has been actuated and can be replaced by any other coil of the same size.

Auxiliary contact complement

The contactors can be fitted with up to 8 auxiliary contacts (identical auxiliary switch blocks from S0 to S12). Of these, no more than 4 are permitted to be NC contacts.

- 3RT10 and 3RT14 contactors:
  Auxiliary contacts mounted laterally and on front
- 3RT12 vacuum contactors:
  Auxiliary contacts mounted laterally

Contactors with conventional operating mechanism

Version 3RT1. ..-.A:

The magnetic coil is switched directly on and off with the control supply voltage U_S by way of terminals A1/A2.

Multi-voltage range for the control supply voltage U_S:
Several closely adjacent control supply voltages, available around the world, are covered by just one coil,
for example 110-115-120-127 V UC or 220-230-240 V UC.

In addition, allowance is also made for a coil operating range of 0.8 times the lower ($U_{S\,min}$) and 1.1 times the upper ($U_{S\,max}$) rated control supply voltage within which the contactor switches reliably and no thermal overloading occurs.

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactors with solid-state operating mechanism

The magnetic coil is supplied selectively with the power required for reliable switching and holding by series-connected control electronics.

- Wide voltage range for the control supply voltage U_S:
  Compared with the conventional operating mechanism, the solid-state operating mechanism covers an even broader range of control supply voltages used worldwide within one coil variant. For example, the coil for 200 to 277 V UC ($U_{S\,min}$ to $U_{S\,max}$) covers the voltages 200-208-220-230-240-254-277 V used worldwide.
- Extended tolerance 0.7 to 1.25 x U_S:
  The wide range for the rated control supply voltage and the additionally allowed coil tolerance of 0.8 x $U_{S\,min}$ to 1.1 x $U_{S\,max}$ results in an extended coil tolerance of at least 0.7 to 1.25 x U_S, within which the contactors will operate reliably, for the most common control supply voltages of 24, 110 and 230 V.
- Bridging temporary voltage dips:
  Control voltage failures dipping to 0 V (at A1/A2) are bridged for up to approx. 25 ms to avoid unintentional tripping.
- Defined ON and OFF thresholds:
  For voltages of ≥ 0.8 x $U_{S\,min}$ and higher the electronics will reliably switch the contactor ON, and as of ≤ 0.5 x $U_{S\,min}$ it is reliably switched off. The differential travel in the switching thresholds prevents the main contacts from chattering as well as increased wear or welding when operated in weak, unstable networks. This also prevents thermal overloading of the contactor coil if the voltage applied is too low (contactor does not close properly and is continuously operated with overexcitation).
- Low control power consumption when closing and in the closed state.

Electromagnetic compatibility (EMC)

The contactors with solid-state operating mechanism comply with the requirements for operation in industrial installations.

- Interference immunity
  - Burst (IEC 61000-4-4): 4 kV
  - Surge (IEC 61000-4-5): 4 kV
  - Electrostatic discharge, ESD (IEC 61000-4-2): 8/15 kV
  - Electromagnetic field (IEC 61000-4-3): 10 V/m
- Emitted interference
  - Limit value class A according to EN 55011

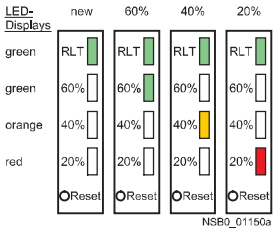
Note:
In connection with converters, the control cables should be installed separately from the load cables to the converter.

Indication of remaining lifetime (RLT) "Remaining lifetime"

Main contactor contacts are working parts which must be replaced in good time when the end of their service life has been reached. The degree of contact erosion and thus the electrical endurance (= number of operating cycles) depends on the loading, utilization category, duty type, etc. Routine checks/visual inspections by the service personnel are needed in order to monitor the state of the main contacts. The remaining lifetime indication function takes over this task. It does not count the number of operating cycles – which does not provide information about contact erosion – but instead electronically identifies, evaluates and stores the actual progress of erosion of each one of the three main contacts, and outputs a warning when specified limits are reached. The stored data are not lost even if the control supply voltage for A1/A2 fails. After replacement of the main contacts, measurement the remaining lifetime must be reset using the "RESET" button (hold down RESET button for about 2 seconds using a pen or similar tool).

Advantages:

- Signaling through relay contact or AS-i when remaining lifetime is 20 %, i.e. contact material wear is 80 %
- Additional visual indication of various levels of erosion by means of LEDs on the laterally mounted solid-state module when remaining lifetime is 60 % (green), 40 % (orange) and 20 % (red)



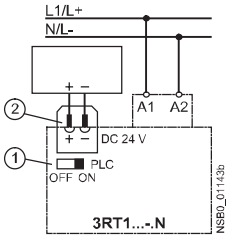
- Early warning to replace contacts
- Optimum utilization of contact material
- Visual inspection of the condition of contacts no longer necessary
- Reduction of ongoing operating costs
- Optimum planning of maintenance measures
- Avoidance of unforeseen plant downtimes

3RT1...-.N version: for 24 V DC PLC output

2 control options:

- Control without an interface directly through a 24 V DC/≥ 30 mA PLC output (EN 61131-2). Connection by means of 2-pole plug-in connection. The screwless spring-operated connector is part of the scope of supply. The control supply voltage which supplies the solenoid operating mechanism must be connected to A1/A2.

Note:
Set the slide switch for PLC operation to "PLC ON" before commissioning (factory setting: "PLC OFF").

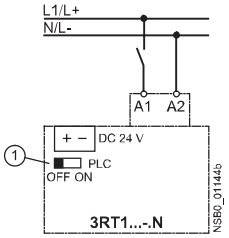


① Slide switch must be in "PLC ON" position

② Plug-in connection, 2-pole

- Conventional control by applying the control supply voltage at A1/A2 through a switching contact.

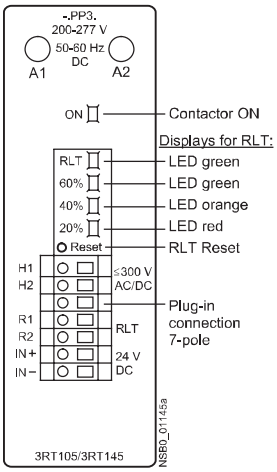
Note:
Slide switch must be in "PLC OFF" position (= factory setting).



① Slide switch must be in "PLC OFF" position

3RT10 contactors, 3-pole, 3 ... 250 kW

3RT1...-.P version: for 24 V DC PLC output or
PLC relay output, with indication of remaining lifetime (RLT).

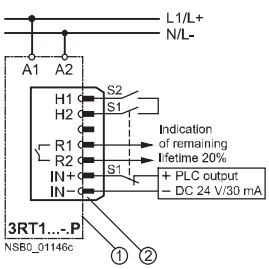


To supply the solenoid and the remaining lifetime indicator with power, the control supply voltage U_S must be connected to terminals A1/A2 of the laterally mounted solid-state module. The control inputs of the contactor are connected to a 7-pole plug-in connection; the screwless spring-operated connector is part of the scope of supply.

- The "Remaining lifetime (RLT)" status signal is available at terminals R1/R2 through a floating relay contact (hard gold-plated, enclosed) and can be input to SIMOCODE, PLC or other devices for processing, for example.
  Permissible current-carrying capacity of the R1/R2 relay output:
  - I_e/AC-15/24 to 230 V: 3 A
  - I_e/DC-13/24 V: 1 A
- LED indicators
  The following states are indicated by means of LEDs on the laterally mounted solid-state module:
  - Contactor ON (energized state): Green LED ("ON")
  - Indication of remaining lifetime

2 control options:

- Contactor control without an interface directly through a 24 V DC/≥ 30 mA PLC output (EN 61131-2) by way of terminals IN+/IN-.



① Solid-state module of 3RT1. ..-.P contactor

② Plug-in connection, 7-pole

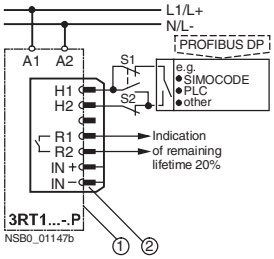
S1 Selector switch for switching from automatic control through PLC semiconductor output to local control

S2 Local control option

Possibility of switching from automatic control to local control by way of terminals H1/H2, i.e. automatic control through PLC or SIMOCODE/PROFIBUS DP can be deactivated e.g. at startup or in the event of a fault and the contactor can be controlled manually.

- Contactor control through relay outputs, e.g. by
  - PLC
  - SIMOCODE

by way of terminals H1/H2. Contact loading: U_S/approx. 5 mA. When operated through SIMOCODE, a communication link to PROFIBUS DP is also provided.



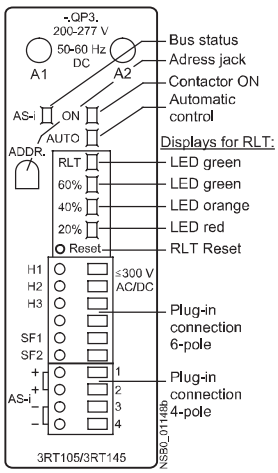
① Solid-state module of 3RT1. ..-.P contactor

② Plug-in connection, 7-pole

S1 Selector switch for switching from automatic control, for example, through SIMOCODE or PLC relay output to local control

S2 Local control option

3RT1. ..-.Q version: Communication-capable with integrated AS-Interface and indication of remaining lifetime (RLT)



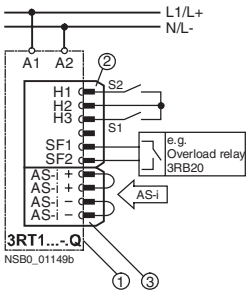
To supply the solenoid and the remaining lifetime indicator with power, the control supply voltage U_S must be connected to terminals A1/A2 of the laterally mounted solid-state module. The contactor itself is controlled by way of the integrated AS-Interface interface. The inputs and outputs are connected to a 10-pole plug-in connection; the screwless spring-operated connectors (6-pole for external connection and 4-pole for AS-Interface connection) are part of the scope of supply.

- LED indications
  The following states are indicated by means of LEDs on the laterally mounted solid-state module:
  - Contactor ON (energized state): Green LED ("ON")
  - Automatic/Local control: Green LED ("AUTO")
  - Bus status: Green/red dual LED ("AS-i")
  - Indication of remaining lifetime (RLT)
- AS-Interface addressing socket "ADDR":
  The contactor address can be assigned after installation.

3RT10 contactors, 3-pole, 3 ... 250 kW

Control circuit:

- Contactor control through AS-Interface by way of terminals AS-i +/AS-i –. Each of these terminals is jumpered and connected twice to a 4-pole connector which is separate from the other control inputs.
  Advantages:
  - The AS-Interface cable is not interrupted if the connector is pulled out
  - The contactor remains functional through the local control inputs and its own 6-pole connector
- Control signals through AS-i:
  - Contactor ON/OFF
- Status signals through AS-i:
  - Contactor ON/OFF
  - Automatic/Local control:
  - Indication of remaining lifetime (RLT)
  - Signal through free input, e.g. overload relay tripped.



① Solid-state module of 3RT1. ..-.Q contactor

② Plug-in connection, 6-pole

③ Plug-in connection, 4-pole

S1 Selector switch for switching from automatic control, for example, through AS-Interface to local control
S1 open: Automatic mode

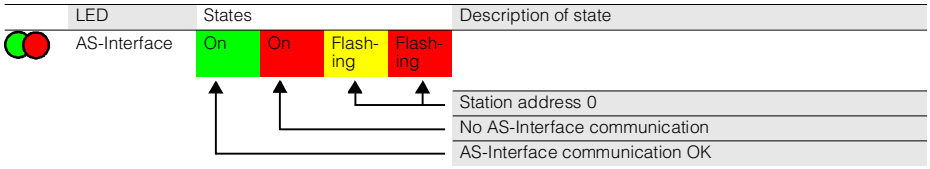
S2 Local control option

Possibility of switching from automatic control to local control by means of terminals H1/H2/H3, i.e. automatic control through AS-Interface can be deactivated e.g. during startup or in the event of a fault and the contactor can be controlled manually.

I/O configuration (hex) **ID code (hex)**		7 F
Power supply	V	26,5 ... 31.6 (acc. to AS-Interface specification)
AS-Interface current input	mA	max. 20
Contact loading at SF1/2	mA	3 ... 6
Watchdog function (disconnects outputs in the event of AS-Interface fault)		Built-in

Indication behavior

During operation, the LEDs on the contactor indicate the states shown on the right.



Contactor diagnostics using the application program

• Inputs

Input signals			Device status
DI0	"Ready"	0	Device not ready/manual operation
		1	Device ready/automatic operation
DI1	"Running"	0	Contactor off
		1	Contactor on
DI2	"Remaining lifetime"	0	Remaining lifetime RLT > 20 %
		1	Remaining lifetime RLT ≤ 20 %
DI3	"Free input"	0	No input signal at SF1/2
		1	Input signal at SF1/2

• Outputs

Output signals			Device status
DO0	"Running"	0	Contactor off
		1	Contactor on
DO1		0	--
		1	--
DO2		0	--
		1	--
DO3		0	--
		1	--

3RT10 contactors, 3-pole, 3 ... 250 kW

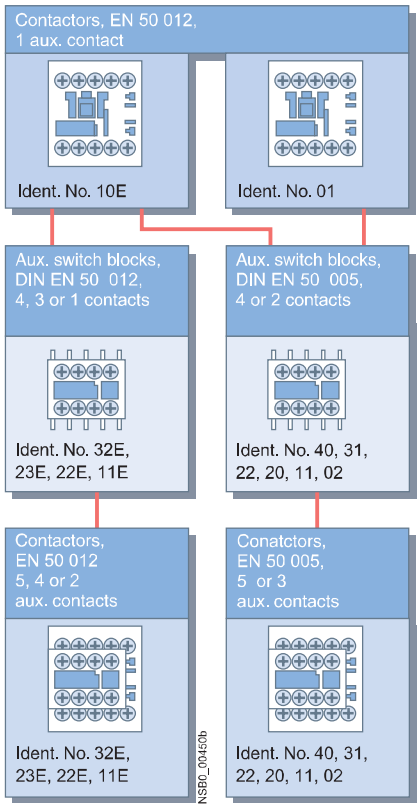
Integration

Auxiliary switch blocks

Various auxiliary switch blocks can be added to the 3RT1 basic units depending on the application:

Size S00

3RT10 1. contactors,
terminal designations according to EN 50012 or EN 50005.



Size S00 contactors have an auxiliary contact integrated in the basic unit.

Contactors with a NO contact as auxiliary contact with screw or Cage Clamp terminal, identification number 10E, can be expanded into contactors with 2, 4 and 5 auxiliary contacts according to EN 50012 using auxiliary switch blocks. The identification numbers 11E, 22E, 23E and 32E on the auxiliary switch blocks apply to the complete contactors. These auxiliary switch blocks cannot be combined with contactors which have a NC contact in the basic unit (identification number 01) as they are coded.

All contactors of size S00 with one auxiliary contact (identification numbers 10E or 01) and the contactors with 4 main contacts can be expanded into contactors with 3 or 5 auxiliary contacts using auxiliary switch blocks with the identification numbers 40 to 02 (in the case of contactors with 4 main contacts: 2 or 4 auxiliary contacts) according to EN 50005.

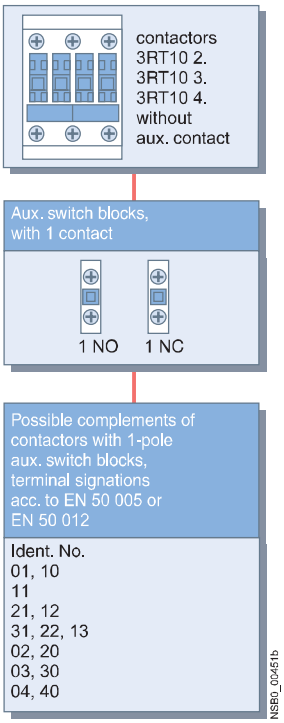
The identification numbers on the auxiliary switch blocks apply only to the attached auxiliary switches.
Single- or 2-pole auxiliary switch blocks with connection options from above or below enable easy and clearly arranged wiring especially for the installation of network access junctions. These auxiliary switch blocks are offered only with screw terminals.

The electronically-optimized auxiliary switch blocks 3RH19 11-1NF.. for contactors of size S00 include 2 enclosed contacts. They are suitable in particular for switching small voltages and currents (hard gold-plated contacts) and for operation in dusty atmospheres. The NC auxiliary contacts are not mirror contacts.

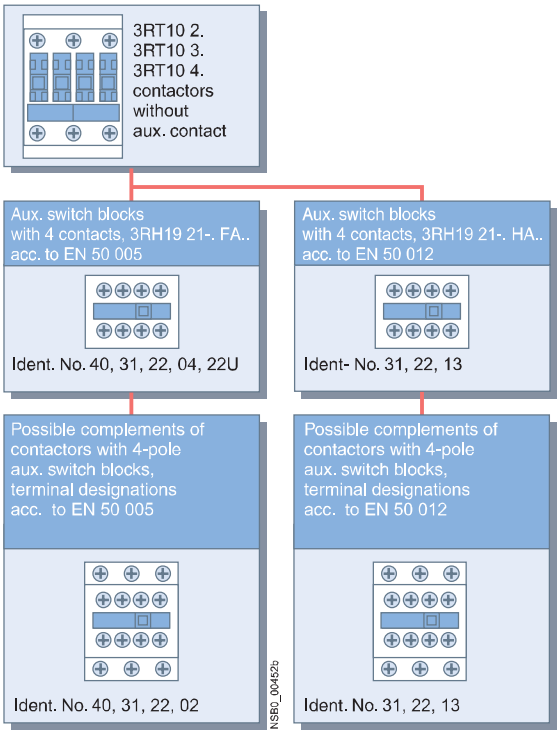
All the previously mentioned auxiliary switch variants can be snap-fitted onto the front of the contactor. The auxiliary switch block has a centrally positioned release lever for disassembly.

Sizes S0 to S3

3RT10 2. 3RT10 4. contactors, single-pole auxiliary switch blocks,
terminal designation according to EN 50005 or EN 50012.



3RT10 2. to 3RT10 4. contactors,
4-pole auxiliary switch blocks,
terminal designation according to EN 50005 or EN 50012.



A diverse range of auxiliary switch blocks is available for various applications. The contactors themselves have no integrated control circuit.

The auxiliary switch variants are uniform for the contactors of size S0 to S12.

One 4-pole or up to four single-pole auxiliary switch blocks (screw or Cage Clamp terminals) can be snapped on. When the contactors are switched on, the NC contacts are opened first and then the NO contacts are closed.

The terminal designations of the single-pole auxiliary switch locks are comprised of sequence numbers (location identifiers) on the basic unit and of function numbers on the auxiliary switch blocks.

Also available are 2-pole auxiliary switch blocks (screw terminals) for cable entry from above or below in the type of construction of a quad block (feeder auxiliary switch).

If the installation space is limited in depth, 2-pole auxiliary switch blocks (screw or Cage Clamp terminals) can be attached laterally for use on the left or on the right.

The auxiliary switch blocks attached to the front can be disassembled with the help of a centrally arranged release lever; the laterally attached auxiliary switch blocks are easy to remove by pressing on the checkered surfaces.

The terminal designation of the individual auxiliary switch blocks corresponds to EN 50005 or EN 50012, that of the complete contactor with auxiliary switch block 2 NO + 2 NC corresponds to EN 50012.

The laterally attachable auxiliary switch blocks according to EN 50012 can be used only when no 4-pole auxiliary switch blocks are snapped onto the front. If single-pole auxiliary switch blocks are used in addition, the location identifiers on the contactor must be noted.

3RT10 contactors, 3-pole, 3 ... 250 kW

Two enclosed and 2 standard contacts are available with the 3RH19 21-.FE22 electronically optimized auxiliary switch block, which can be attached to the front. The 3RH19 21-2DE11 laterally mountable auxiliary switch block contains 2 enclosed contacts (1 NO + 1 NC). The enclosed contacts are suitable in particular for switching small voltages and currents (hard gold-plated contacts) and for operation in dusty atmospheres. The NC auxiliary contacts are mirror contacts.

Sizes S0 and S2

A maximum of 4 auxiliary contacts can be attached; the auxiliary switch blocks used can be of any type. For reasons of symmetry, when two 2-pole laterally mountable auxiliary switch blocks are used, one block must be attached on the right and one on the left.

More auxiliary contacts are permissible with size S2 under certain conditions (please inquire).

For 4-pole contactors see 3RT13 and 3RT15.

Size S3 to S12

A maximum of 8 auxiliary contacts can be attached; please note the following:

- Of these 8 auxiliary contacts, there must be no more than 4 NC contacts
- Ensure the symmetry of laterally mounted auxiliary switch blocks

For 4-pole contactors see 3RT13 and 3RT15.

3RT10 contactors, 3-pole, 3 ... 250 kW

Technical specifications

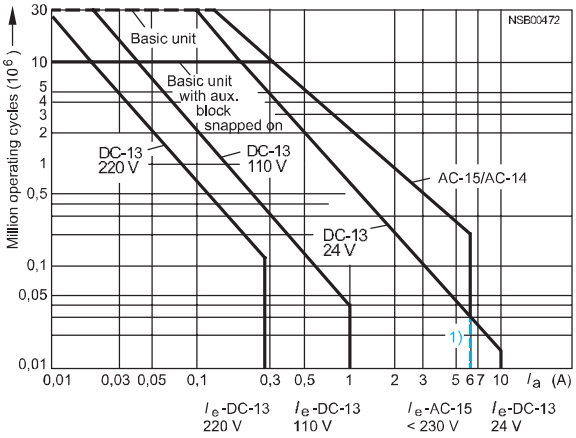
SIRIUS controls are climate-proof and are suitable and tested for use worldwide.

If the devices are used in environmental conditions which deviate from common industrial conditions (EN 60721-3-3 "Stationary Use, Weather-Protected"), the manufacturer must be consulted about possible restrictions with regard to the reliability and endurance of the device and possible protective measures.

Contactor Type Size			3RT1 S00 to S12
Rated data of the auxiliary contacts			
Acc. to IEC 60947-5-1/EN 60947-5-1 (VDE 0660 Part 200) The data apply to integrated auxiliary contacts and contacts in the auxiliary switch blocks for contactor sizes S00 to S12[1)]			
Rated insulation voltage U_i (pollution degree 3)		V	690
For 3RH19 21-. laterally mountable auxiliary switch blocks		V	Max. 500
Continuous thermal current I_{th} = **Rated operational current I_e/AC-12**		A	10
AC load			
Rated operational current I_e/AC-15/AC-14			
For rated operational voltage U_e	24 V	A	6
	110 V	A	6
	125 V	A	6
	220 V	A	6
	230 V	A	6
	380 V	A	3
	400 V	A	3
	500 V	A	2
	660 V[2)]	A	1
	690 V[2)]	A	1
DC load			
Rated operational current I_e/DC-12			
For rated operational voltage U_e	24 V	A	10
	60 V	A	6
	110 V	A	3
	125 V	A	2
	220 V	A	1
	440 V	A	0,3
	600 V[2)]	A	0,15
Rated operational current I_e/DC-13			
For rated operational voltage U_e	24 V	A	10[1)]
	60 V	A	2
	110 V	A	1
	125 V	A	0,9
	220 V	A	0,3
	440 V	A	0,14
	600 V[2)]	A	0,1
• **Contact reliability at 17 V, 1 mA** acc. to EN 60947-5-4			Frequency of contact faults < 10^{-8} i.e. < 1 fault per 100 million operating cycles

Endurance of the auxiliary contacts

It is assumed that the operating mechanisms are switched randomly, i.e. not synchronized with the phase angle of the supply system.
The contact endurance is mainly dependent on the breaking current.
The characteristic curves apply to
- Integrated auxiliary contacts for 3RT10
- 3RH19 11, 3RH19 21 auxiliary switch blocks for contactor sizes S00 to S12.



Legend:
I_a = Breaking current
I_e = Rated operational current

1) Attachable auxiliary switch blocks for size S00 and laterally mountable auxiliary switch blocks for S0 to S12: 6 A.

2) Up to 500 V switching capacity for laterally moutable auxiliary switch blocks.

Endurance of the main contacts

The characteristic curves show the contact endurance of the contactors when switching resistive and inductive AC loads (AC-1/AC-3) depending on the breaking current and rated operational voltage. It is assumed that the operating mechanisms are switched randomly, i.e. not synchronized with the phase angle of the supply system.

The rated operational current I_e complies with utilization category AC-4 (breaking six times the rated operational current) and is intended for a contact endurance of at least 200 000 operating cycles.

If a shorter endurance is sufficient, the rated operational current I_e/AC-4 can be increased.

If the contacts are used for **mixed operation**, i.e. if normal switching (breaking the rated operational current according to utilization category AC-3) in combination with intermittent inching (breaking s everal times the rated operational current according to utilization category AC-4), the contact endurance can be calculated approximately from the following equation:

$$X = \frac{A}{1 + \frac{C}{100}\left(\frac{A}{B} - 1\right)}$$

Characters in the equation:

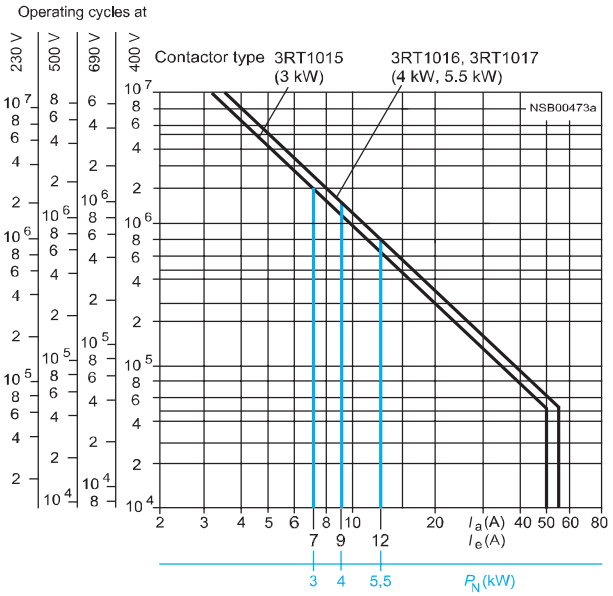
X Contact endurance for mixed operation in operating cycles

A Contact endurance for normal operation ($I_a = I_e$) in operating cycles

B Contact endurance for inching (I_a = multiple of I_e) in operating cycles

C Inching operations as a percentage of total switching operations

Size S00



Size S0

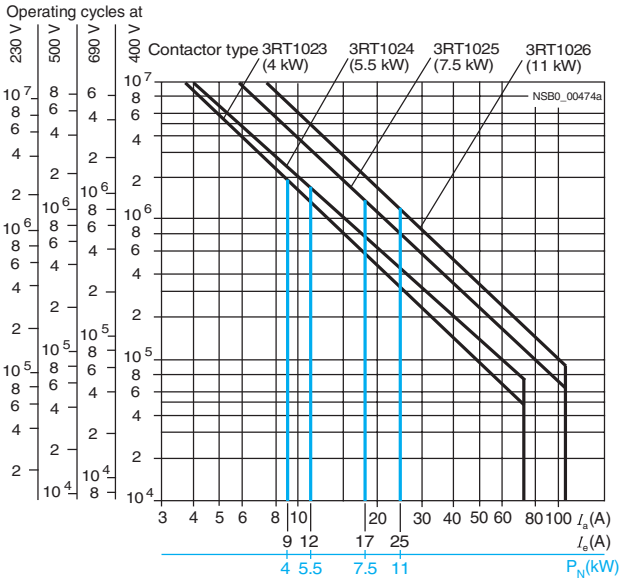


Diagram legend:

P_N= Rated output power for squirrel-cage motors at 400 V

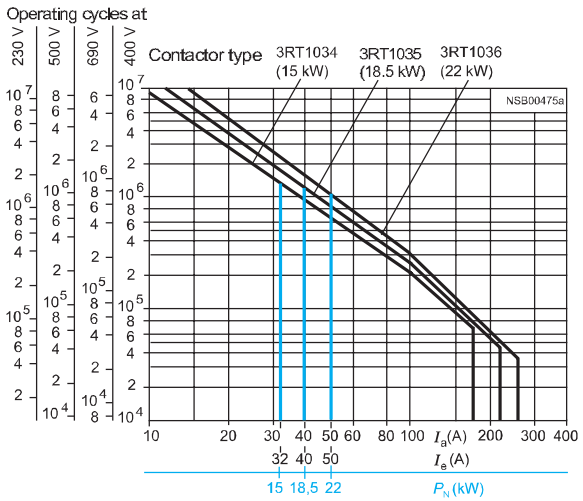
I_a= Breaking current

I_e= Rated operational current

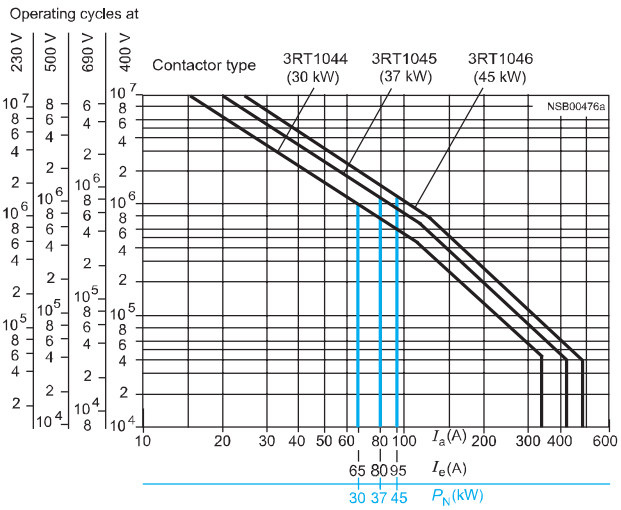
3RT10 contactors, 3-pole, 3 ... 250 kW

Endurance of the main contacts

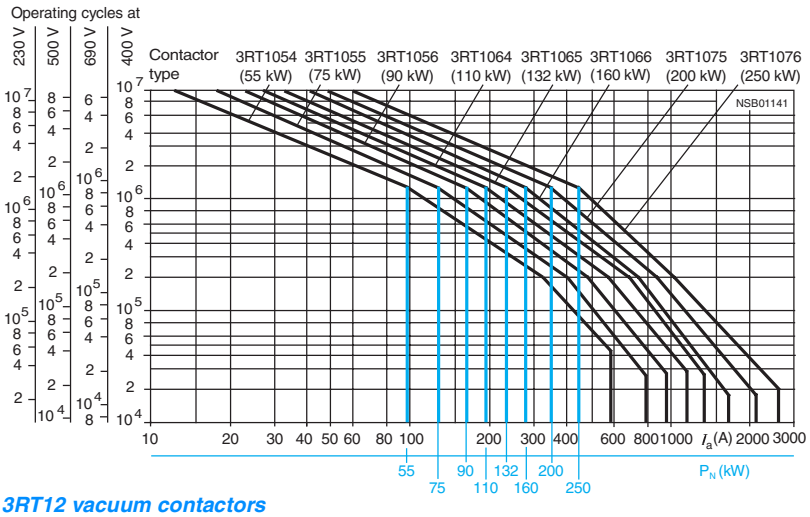
Size S2



Size S3



Sizes S6 to S12



3RT12 vacuum contactors
Sizes S10 and S12

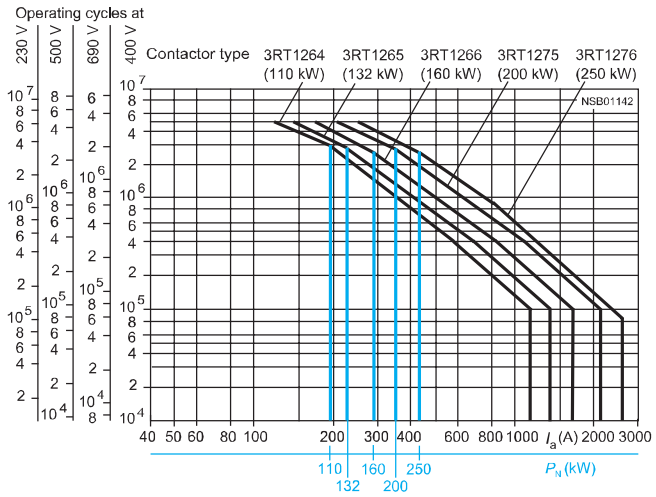
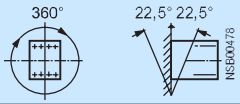


Diagram legend:
P_N= Rated output power for squirrel-cage motors at 400 V
I_a= Breaking current
I_e= Rated operational current

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type Size		**3RT10 1.** **S00**
General data			
Permissible mounting position The contactors are designed for operation on a vertical mounting surface.	AC and DC operation		
Upright mounting position:	AC operation		 Special design required.
	DC operation		Standard version
Mechanical endurance	Basic unit	Operating cycles	30 million
	Basic unit with snap-on auxiliary switch block		10 million
	Solid-state compatible auxiliary switch block		5 million
Electrical endurance			1)
Rated insulation voltage U_i (pollution degree 3)		V	690
Rated impulse withstand voltage U_{imp}		kV	6
Safe isolation Between the coil and the contacts acc. to EN 60947-1, Appendix N		V	400
Miror contacts • A mirror contact is an auxiliary NC contact that cannot be closed simultaneously with a NO main contact.	3RT10 1., 3RT13 1. (removable auxiliary switch block)		Yes. This applies to both the basic unit as well as to between the basic unit and the mounted auxiliary switch block acc. to EN 60947-4-1, Appendix F.
	3RT10 1., 3RT13 1. (permanent auxiliary switch block)		Yes. Acc. to EN 60947-4-1, Appendix F, SUVA
• No mirror contacts for the solid-state compatible auxiliary switch blocks	3RH19 11-.NF..		
Ambient temperature	During operation During storage	°C °C	-25 ... +60 -55 ... +80
Degree of protection acc. to EN 60947-1, Appendix C **Touch protection** acc. to EN 50274			IP20, coil assembly IP40 Finger-safe
Shock resistance rectangular pulse	AC operation DC operation	g/ms g/ms	7/5 and 4.2/10 7/5 and 4.2/10
Shock resistance sine pulse	AC operation DC operation	g/ms g/ms	9.8/5 and 5.9/10 9.8/5 and 5.9/10
Conductor cross-sections			2)
Short-circuit protection for contactors without overload relays			
			For short-circuit protection for contactors with overload relays see Protection Equipment: Overload Relays For short-circuit protection for fuseless load feeders see Load Feeders, Motor Starters and Soft Starters: -> 3RA Fuseless Load Feeders.
Main circuit			
• Fuse links gL/gG NH 3NA, DIAZED 5SB, NEOZED 5SE - Acc. to IEC 60947-4-1/ EN 60947-4-1	Type of coordination "1" Type of coordination "2" Weld-free[3]	A A A	35 20 10
• Miniature circuit-breakers (up to 230 V) with C-characteristic Short-circuit current 1 kA, type of coordination "1"		A	10
Auxiliary circuit			
• Fuse links gL/gG DIAZED 5SB, NEOZED 5SE (weld-free protection $I_k \geq 1$ kA)		A	10
• Miniature circuit-breakers up to 230 V with C characteristis Short-circuit current $I_k < 400$ A		A	6

1) See Endurance of the Main Contacts.

2) For conductor cross-sections see page 3/15.

3) For test conditions according to IEC 60947-4-1 see page 3/20.

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type Size			3RT10 1. S00
Control				
Coil operating range				
• AC operation		50 Hz 60 Hz		0.8 ... 1.1 x U_s 0.85 ... 1.1 x U_s
• DC operation		up to 50 °C up to 60 °C		0.8 ... 1.1 x U_s 0.85 ... 1.1 x U_s
Power consumption of coils (when coil is cold and 1.0 x U_s)				
AC operation, 50/60 Hz				
Standard version	• Closing • p.f. • Closed • p.f.		VA VA 	27/24.3 0.8/0.75 4.4/3.4 0.27/0.27
AC operation, 50 Hz, USA/Canada	• Closing • p.f. for closing • Closed • p.f. for closed		VA VA 	26.4 0.81 4.7 0.26
AC operation, 60 Hz, USA/Canada	• Closing • p.f. for closing • Closed • p.f. for closed		VA VA 	31.7 0.77 5.1 0.27
DC operation	Closing = Closed		W	3.3
Permissible residual current of the electronics (with 0 signal)				
	• AC operation			< 3 mA x (230 V/U_s), the 3RT19 16-1GA00 additional load module is recommended for higher residual currents
	• DC operation			< 10 mA x (24 V/U_s), the 3RT19 16-1GA00 additional load module is recommended for a higher residual current
Operating times[1]				
Total break time = Opening delay + Arcing time				
• AC operation for 0.8 ... 1.1 x U_s	Closing delay Opening delay		ms ms	8 ... 35 4 ... 30
• DC operation for 0.85 ... 1.1 x U_s	Closing delay Opening delay		ms ms	25 ... 100 7 ... 10
• Arcing time			ms	10 ... 15
Operating times for 1.0 x U_s[1]				
• AC operation	Closing delay Opening delay		ms ms	10 ... 25 5 ... 30
• DC operation	Closing delay Opening delay		ms ms	30 ... 50 7 ... 9

1) The opening delay of the NO contact and the closing delay of the NC contact are increased if the contactor coils are attenuated against voltage peaks (noise suppression diode 6 to 10 times; diode assemblies 2 to 6 times, varistor +2 ms to 5 ms).

Contactor	Type Size			3RT10 15 S00	3RT10 16 S00	3RT10 17 S00
Main circuit						
AC capacity						
Utilization category AC-1 **Switching resistive loads**						
Rated operational current I_e		at 40 °C up to 690 V at 60 °C up to 690 V	A A	18 16	22 20	22 20
Rated output power for AC loads[1] p.f. = 0.95 (for 60 °C)		230 V 400 V 500 V 690 V	kW kW kW kW	6.3 11 13.8 19	7.5 13 17 22	7.5 13 17 22
Minimum conductor cross-section for loads with I_e		for 40 °C for 60 °C	mm^2 mm^2	2.5 2.5	2.5 2.5	2.5 2.5
Utilization categories AC-2 and AC-3						
Rated operational current I_e		up to 400 V 440 V 500 V 690 V	A A A A	7 7 5 4	9 9 6.5 5.2	12 11 9 6.3
Rated output power for slipring or squirrel-cage motors at 50 Hz and 60 Hz		at 230 V 400 V 500 V 690 V	kW kW kW kW	2.2 3 3.5 4	3 4 4.5 5.5	3 5.5 5.5 5.5
Thermal load capacities		10 s current[2]	A	56	72	96

1) Industrial furnaces and electric heaters with resistance heating, etc. (increased power consumption on heating up has been taken into account).

2) According to IEC 60947-4-1. For rated values for various start-up conditions see Protection Equipment: Overload Relays.

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor Type Size			3RT10 15 S00	3RT10 16 S00	3RT10 17 S00
Main circuit					
AC capacity					
Power loss per conducting path	for I_e/AC-3	W	0.42	0.7	1.24
Utilization category AC-4 (for I_a = 6 x I_e)[1]					
Rated operational current I_e	up to 400 V	A	6.5	8.5	8.5
Rated output power for squirrel-cage motors at 50 Hz and 60 Hz	up to 400 V	kW	3	4	4
• The following applies to an endurance of about 200 000 operating cycles:					
- Rated operational currents I_e	up to 400 V	A	2.6	4.1	4.1
	690 V	A	1.8	3.3	3.3
- Rated output power for squirrel-cage motors with 50 Hz and 60 Hz	at 230 V	kW	0.67	1.1	1.1
	400 V	kW	1.15	2	2
	500 V	kW	1.45	2	2
	690 V	kW	1.15	2.5	2.5
Utilization category AC-5a **Switching gas discharge lamps, inductive ballast** Per main current path at 230 V					
• Uncorrected, rated output power per lamp/rated operational current per lamp					
	L 18 W/0.37 A	units	30	43	43
	L 36 W/0.43 A	units	26	37	37
	L 58 W/0.67 A	units	16	23	23
• Lead-lag circuit, rated output power per lamp/rated operational current per lamp					
	L 18 W/0.11 A	units	100	144	144
	L 36 W/0.21 A	units	54	76	76
	L 58 W/0.32 A	units	35	50	50
Switching gas discharge lamps with correction Per main current path at 230 V					
• Shunt compensation with inductive ballast, rated output power per lamp/capacitance/ rated operational current per lamp					
	L 18 W/4.5 µF/0.11 A	units	16	22	22
	L 36 W/4.5 µF/0.21 A	units	16	22	22
	L 58 W/7.0 µF/0.32 A	units	10	14	14
• With solid-state ballast (single lamp)					
	L 18 W/6.8 µF/0.10 A	units	44	63	63
	L 36 W/6.8 µF/0.18 A	units	25	35	35
	L 58 W/10 µF/0.27 A	units	16	23	23
• With solid-state ballast (two lamps)					
	L 18 W/10 µF/0.18 A	units	25	35	35
	L 36 W/10 µF/0.35 A	units	13	18	18
	L 58 W/22 µF/0.52 A	units	8	12	12
Utilization category AC-5b, switching incandescent lamps Per main conducting path at 230/220 V		kW	1.2	1.6	1.6
Utilization category AC-6a **Switching AC transformers**					
Rated operational current I_e					
• For inrush current n = 20	up to 400 V	A	3.6	5.1	7.2
• For inrush current n = 30	up to 400 V	A	2.4	3.3	5.1
Rated output power P					
• For inrush current n = 20	at 230 V	kVA	1.4	2	2.9
	400 V	kVA	2.5	3.5	5
	500 V	kVA	3.3	4.6	6.2
	690 V	kVA	4.3	6	8.6
• For inrush current n = 30	at 230 V	kVA	1	1.3	2
	400 V	kVA	1.6	2.3	3.5
	500 V	kVA	2.2	3.1	4.6
	690 V	kVA	2.9	4	6

For deviating inrush current factors x, the power must be recalculated as follows:
$P_x = P_{n30} \cdot 30/x$

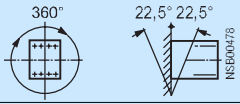
1) The data only apply to 3RT15 16 and 3RT15 17 (2 NO + 2 NC) up to a rated operational voltage of 400 V.

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type Size			3RT10 15 S00	3RT10 16 S00	3RT10 17 S00
Main circuit						
Load rating with DC						
Utilization category DC-1 **Switching resistive loads (L/R ≤ 1ms)** Rated operational current I_e (for 60 °C)						
• 1 current path		up to 24 V	A	15	20	
		60 V	A	15	20	
		110 V	A	1.5	2.1	
		220 V	A	0.6	0.8	
		440 V	A	0.42	0.6	
		600 V	A	0.42	0.6	
• 2 current paths in series		up to 24 V	A	15	20	
		60 V	A	15	20	
		110 V	A	8.4	12	
		220 V	A	1.2	1.6	
		440 V	A	1.6	0.8	
		600 V	A	0.5	0.7	
• 3 current paths in series		up to 24 V	A	15	20	
		60 V	A	15	20	
		110 V	A	15	20	
		220 V	A	15	20	
		440 V	A	0.9	1.3	
		600 V	A	0.7	1	
Utilization category DC-3 and DC-5 **Shunt-wound and series-wound motors (L/R ≤ 15 ms)** Rated operational current I_e (for 60 °C)						
• 1 current path		up to 24 V	A	15	20	
		60 V	A	0.35	0.5	
		110 V	A	0.1	0.15	
		220 V	A	--	--	
		440 V	A	--	--	
		600 V	A	--	--	
• 2 current paths in series		up to 24 V	A	15	20	
		60 V	A	3.5	5	
		110 V	A	0.25	0.35	
		220 V	A	--	--	
		440 V	A	--	--	
		600 V	A	--	--	
• 3 current paths in series		up to 24 V	A	15	20	
		60 V	A	15	20	
		110 V	A	15	20	
		220 V	A	1.2	1.5	
		440 V	A	0.14	0.2	
		600 V	A	0.14	0.2	
Operating frequency						
Operating frequency z in operating cycles/hour						
• Contactors without overload relay		No-load operating frequency AC	h^{-1}	10000		
		No-load operating frequency DC	h^{-1}	10000		
Dependence of the operating frequency z' on the operational current I' and operational voltage U': $z' = z \cdot (I_e/I') \cdot (400\ V/U')^{1.5} \cdot 1/h$		Rated operation				
		AC-1 (AC/DC)	h^{-1}	1000		
		AC-2 (AC/DC)	h^{-1}	750		
		AC-3 (AC/DC)	h^{-1}	750		
		AC-4 (AC/DC)	h^{-1}	250		
• Contactors with overload relays (mean value)			h^{-1}	15		
Conductor cross-sections						
• Screw terminals (1 or 2 conductors connectable) For standard screwdriver size 2 and Pozidriv 2	**Main and auxiliary conductors:**					
	• Solid		mm^2	2 x (0.5 ... 1.5) 2 x (0.75 ... 2.5) acc. to IEC 60947; max. 2 x (1 ... 4)		
	• Finely stranded with end sleeve		mm^2	2 x (0.5 ... 1.5) 2 x (0.75 ... 2.5)		
	• Solid or stranded, AWG conductors		AWG	2 x (20 ... 16) 2 x (18 ... 14) 1 x 12		
	• Terminal screw			M3		
	- Tightening torque		Nm	0.8 ... 1.2 (7 ... 10.3 lb.in)		
• Cage Clamp terminals (1 or 2 conductors connectable)	**Main and auxiliary conductors; coil connections:**					
	• Solid		mm^2	2 x (0.25 ... 2.5)		
	• Finely stranded with end sleeve		mm^2	2 x (0.25 ... 1.5)		
	• Finely stranded without end sleeve		mm^2	2 x (0.25 ... 2.5)		
	• AWG conductors, solid or stranded		AWG	2 x (24 ... 14)		

For tools for opening Cage Clamp terminals see Catalog LV 1, Chapter 3, Accessories and Spare Parts.
Maximum outer diameter of the conductor insulation: 3.6 mm.
With conductor cross-sections ≤ 1 mm² an "insulation stop" must be used, see Catalog LV 1, Chapter 3, Accessories and Spare Parts.

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type Size		3RT10 23 S0	3RT10 24 S0	3RT10 25 S0	3RT10 26 S0
General data						
Permissible mounting position The contactors are designed for operation on a vertical mounting surface.	AC and DC operation					
Upright mounting position:	AC operation		 Standard version			
	DC operation		Special version required, also applies to 3RT10 2.-.K.40. coupling relays			
Mechanical endurance	Basic unit	Operating cycles	10 million			
	Basic unit with snap-on auxiliary switch block		10 million			
	Solid-state compatible auxiliary switch block		5 million			
Electrical endurance			1)			
Rated insulation voltage U_i (pollution degree 3)		V	690			
Rated impulse withstand voltage U_{imp}		kV	6			
Safe isolation Between the coil and the contacts acc. to EN 60947-1, Appendix N		V	400			
Mirror contacts • A mirror contact is an auxiliary NC contact that cannot be closed simultaneously with a NO main contact.	3RT10 2., 3RT13 2. (removable auxiliary switch block)		Yes. Acc. to EN 60947-4-1, Appendix F			
• Mirror contacts with solid-state compatible auxiliary switch blocks acc. to SUVA requirements on request.	3RT10 2., 3RT13 2. (permanent auxiliary switch block)		Yes. Acc. to EN 60947-4-1, Appendix F, SUVA			
Permissible ambient temperature	During operation During storage	°C °C	-25 ... +60 -55 ... +80			
Degree of protection acc. to EN 60947-1, Appendix C **Touch protection** acc. to EN 50274			IP20, coil assembly IP20 Finger-safe			
Shock resistance rectangular pulse	AC operation DC operation	g/ms g/ms	8.2/5 and 4.9/10 10/5 and 7.5/10			
Shock resistance sine pulse	AC operation DC operation	g/ms g/ms	12.5/5 and 7.8/10 15/5 and 10/10			
Conductor cross-sections			2)			
Short-circuit protection for contactors without overload relays						
Main circuit			For short-circuit protection for contactors with overload relays see Protection Equipment: Overload Relays For short-circuit protection for fuseless load feeders see Load Feeders, Motor Starters and Soft Starters: -> 3 RA Fuseless Load Feeders.			
• Fuse links gL/gG NH 3NA, DIAZED 5SB, NEOZED 5SE						
- Acc. to IEC 60947-4-1/ EN 60947-4-1	Type of coordination "1"	A	63			100
	Type of coordination "2"	A	25			35
	Weld-free[3]	A	10			16
• Miniature circuit-breakers with C-characteristic (short-circuit current 3kA, type of coordination "1")		A	25			32
Auxiliary circuit						
• Fuse links gL/gG DIAZED 5SB, NEOZED 5SE (weld-free protection at $I_k \geq 1$ kA)		A	10			
• Miniature circuit-breaker with C-characteristic (short-circuit current $I_k < 400$ A)		A	10			

1) See endurance of the main contacts on page 3/15.

2) See conductor cross-sections on page 3/25.

3) Test conditions according to IEC 60947-4-1.

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type Size		3RT10 2. S0
Control			
Coil operating range	AC/DC		0.8 ... 1.1 x U_s
Input power of coils (when coil is cold and 1.0 x U_s)			
AC operation, 50 Hz, standard version	• Closing	VA	61
	• p.f.		0.82
	• Closed	VA	7.8
	• p.f.		0.24
AC operation, 50/60 Hz, standard version	• Closing	VA	64/63
	• p.f.		0.72/0.74
	• Closed	VA	8.4/6.8
	• p.f.		0.24/0.28
AC operation, 50 Hz, USA/Canada	• Closing	VA	61
	• p.f.		0.82
	• Closed	VA	7.8
	• p.f.		0.24
AC operation, 60 Hz, USA/Canada	• Closing	VA	69
	• p.f.		0.76
	• Closed	VA	7.5
	• p.f.		0.28
DC operation	Closing = Closed	W	5.4
Permissible residual current of the electronics (with 0 signal)			
	• AC operation	mA	< 6 mA x (230 V/U_s)
	• DC operation	mA	< 16 mA x (24 V/U_s)
Operating times for 0.8 ... 1.1 x U_s [1]			
Total break time = Opening delay + Arcing time			
• AC operation	Closing delay	ms	8 ... 44
	Opening delay	ms	4 ... 20
• DC operation	Closing delay	ms	50 ... 170
	Opening delay	ms	13.5 ... 15.5
• Arcing time		ms	10
Operating times for 1.0 x U_s [1]			
• AC operation	Closing delay	ms	10 ... 17
	Opening delay	ms	4 ... 20
• DC operation	Closing delay	ms	55 ... 85
	Opening delay	ms	14 ... 15.5

1) The opening delay of the NO contact and the closing delay of the NC contact are increased if the contactor coils are attenuated against voltage peaks (varistor +2 ms up to 5 ms, diode assembly: 2 to 6 times).

Contactor	Type Size			3RT10 23 S0	3RT10 24 S0	3RT10 25 S0	3RT10 26 S0
Main circuit							
AC capacity							
Utilization category AC-1 Switching resistive loads							
Rated operational current I_e	at 40 °C up to 690 V		A	40			
	at 60 °C up to 690 V		A	35			
Rated output power for AC loads [1] p.f. = 0.95 (for 60 °C)	230 V		kW	13.3			
	400 V		kW	23			
	500 V		kW	29			
	690 V		kW	40			
Minimum conductor cross-section for loads with I_e	for 40 °C		mm^2	10			
	for 60 °C		mm^2	10			
Utilization category AC-2 and AC-3							
Rated operational currents I_e	up to 400 V		A	9	12	17	25
	440 V		A	9	12	17	22
	500 V		A	6.5	12	17	18
	690 V		A	5.2	9	13	13
Rated output power for slipring or squirrel-cage motors at 50 Hz and 60 Hz	at 110 V		kW	1.1	1.5	2.2	3
	230 V		kW	3	3	4	5.5
	400 V		kW	4	5.5	7.5	11
	500 V		kW	4.5	7.5	10	11
	660 V / 690 V		kW	5.5	7.5	11	11
Thermal load capacity	10 s current [2]		A	80	110	150	200
Power loss per conducting path	for I_e/AC-3		W	0.4	0.5	0.9	1.6

1) Industrial furnaces and electric heaters with resistance heating, etc. (increased power consumption on heating up has been taken into account).

2) According to IEC 60947-4-1. For rated values for various start-up conditions see Protection Equipment: Overload Relays.

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor Type Size			3RT10 23 S0	3RT10 24 S0	3RT10 25 S0	3RT10 26 S0
Main circuit						
AC capacity						
Utilization category AC-4 (for I_a = 6 x I_e)						
Rated operational current I_e	up to 400 V	A	8.5	12.5	15.5	15.5
Rated output power for squirrel-cage motors with 50 Hz and 60 Hz	at 400 V	kW	4	5.5	7.5	7.5
• The following applies to an endurance of about 200 000 operating cycles:						
Rated operational currents I_e	up to 400 V	A	4.1	5.5	7.7	9
	690 V	A	3.3	5.5	7.7	9
Rated output power for squirrel-cage motors with 50 Hz and 60 Hz	at 110 V	kW	0.5	0.73	1	1.2
	230 V	kW	1.1	1.5	2	2.5
	400 V	kW	2	2.6	3.5	4.4
	500 V	kW	2	3.3	4.6	5.6
	690 V	kW	2.5	4.6	6	7.7
Utilization category AC-5a **Switching gas discharge lamps, inductive ballast** Per main current path at 230 V [1]						
Rated output power per lamp/rated operational current per lamp						
Uncorrected	L 18 W/0.37 A	units	95			
	L 36 W/0.43 A	units	81			
	L 58 W/0.67 A	units	52			
Lead-lag circuit	L 18 W/0.11 A	units	318			
	L 36 W/0.21 A	units	166			
	L 58 W/0.32 A	units	109			
Switching gas discharge lamps with correction Per main current path at 230 V						
Rated output power per lamp/capacitance/rated operational current per lamp						
• Shunt compensation with inductive ballast	L 18 W/4.5 µF/0.11 A	units	37			61
	L 36 W/4.5 µF/0.21 A	units	37			61
	L 58 W/7.0 µF/0.32 A	units	23			39
• With solid-state ballast (single lamp)	L 18 W/6.8 µF/0.10 A	units	105			175
	L 36 W/6.8 µF/0.18 A	units	58			97
	L 58 W/10 µF/0.27 A	units	38			64
• With solid-state ballast (two lamps)	L 18 W/10 µF/0.18 A	units	58			97
	L 36 W/10 µF/0.35 A	units	30			50
	L 58 W/22 µF/0.52 A	units	20			33
Utilization category AC-5b, switching incandescent lamps Per main conducting path at 230/220 V		kW	3			4
Utilization category AC-6a **Switching AC transformers**						
Rated operational current I_e						
• For inrush current n = 20	up to 400 V	A	11.4			20.2
• For inrush current n = 30	up to 400 V	A	7.6			13.5
Rating P						
• For inrush current n = 20	at 230 V	kVA	4.5			8
	400 V	kVA	7.9			13.9
	500 V	kVA	9.9			15.5
	690 V	kVA	13.6			15.5
• For inrush current n = 30	at 230 V	kVA	3			5.4
	400 V	kVA	5.2			9.3
	500 V	kVA	6.6			11.7
	690 V	kVA	9.1			15.5
For deviating inrush current factors x, the power must be recalculated as follows: $P_x = P_{n30} \cdot 30/x$						
Utilization category AC-6b, **switching low-inductance (low-loss, metallized dielectric) AC capacitors**						
Rated operational currents I_e	up to 400 V	A	5.8			10.8
Rated output power for single capacitors or banks of capacitors (minimum inductance of 6 µH between capacitors connected in parallel) at 50 Hz, 60 Hz and	for 230 V	kvar	2.5			4
	400 V	kvar	4			7.5
	500 V	kvar	4			7.5
	690 V	kvar	4			7.5

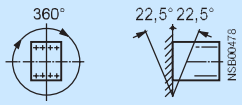
1) For I_e/AC-1 = 35 A (60 °C) and the corresponding minimum conductor cross-section 10 mm^2.

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type / Size			3RT10 23 S0	3RT10 24 S0	3RT10 25 S0	3RT10 26 S0
Main circuit							
Load rating with DC							
Utilization category DC-1, switching of resistive loads (L/R ≤ 1 ms)							
Rated operational current I_e (for 60 °C)							
• 1 current path		up to 24 V	A	35			
		60 V	A	20			
		110 V	A	4.5			
		220 V	A	1			
		440 V	A	0.4			
		600 V	A	0.25			
• 2 current paths in series		up to 24 V	A	35			
		60 V	A	35			
		110 V	A	35			
		220 V	A	5			
		440 V	A	1			
		600 V	A	0.8			
• 3 current paths in series		up to 24 V	A	35			
		60 V	A	35			
		110 V	A	35			
		220 V	A	35			
		440 V	A	2.9			
		600 V	A	1.4			
Utilization category DC-3 and DC-5 Shunt-wound and series-wound motors (L/R ≤ 15 ms)							
Rated operational current I_e (for 60 °C)							
• 1 current path		up to 24 V	A	20			
		60 V	A	5			
		110 V	A	2.5			
		220 V	A	1			
		440 V	A	0.09			
		600 V	A	0.06			
• 2 current paths in series		up to 24 V	A	35			
		60 V	A	35			
		110 V	A	15			
		220 V	A	3			
		440 V	A	0.27			
		600 V	A	0.16			
• 3 current paths in series		up to 24 V	A	35			
		60 V	A	35			
		110 V	A	35			
		220 V	A	10			
		440 V	A	0.6			
		600 V	A	0.6			
Operating frequency							
Operating frequency *z* in operating cycles/hour							
• Contactors without overload relays	No-load operating frequency AC		h^{-1}	5000			
	No-load operating frequency DC		h^{-1}	1500			
		AC-1 (AC/DC)	h^{-1}	1000			
Dependence of the operating frequency *z'* on the operational current *I'* and operational voltage *U'*: $z' = z \cdot (I_e/I') \cdot (400\ V/U')^{1.5} \cdot 1/h$		AC-2 (AC/DC)	h^{-1}	1000			750
		AC-3 (AC/DC)	h^{-1}	1000			750
		AC-4 (AC/DC)	h^{-1}	300			250
• Contactors with overload relays (mean value)			h^{-1}	15			

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type Size		3RT10 23	3RT10 24 S0	3RT10 25 S0	3RT10 26 S0
Conductor cross-sections						
Screw terminals	**Main conductors**					
(1 or 2 conductors connectable)	Conductor cross-section					
	• Solid	mm^2	2 x (1 ... 2.5) 2 x (2.5 ... 6) acc. to IEC 60947; max. 1 x 10			
	• Finely stranded with end sleeve	mm^2	2 x (1 ... 2.5) 2 x (2.5 ... 6)			
	• AWG conductors, solid	AWG	2 x (16 ... 12)			
	• AWG conductors, solid or stranded	AWG	2 x (14 ... 10)			
	• AWG conductors, stranded	AWG	1 x 8			
	• Terminal screws		M4 (Pozidriv size 2)			
	- Tightening torque	Nm	2 ... 2.5 (18 ... 22 lb.in)			
	Auxiliary conductors					
	Conductor cross-section					
	• Solid	mm^2	2 x (0.5 ... 1.5) 2 x (0.75 ... 2.5) acc. to IEC 60947; max. 2 x (0.75 ... 4)			
	• Finely stranded with end sleeve	mm^2	2 x (0.5 ... 1.5) 2 x (0.75 ... 2.5)			
	• Solid or stranded AWG (2 x)	AWG	2 x (20 ... 16) 2 x (18 ... 14) 1 x 12			
	• Terminal screws		M3			
	- Tightening torque	Nm	0.8 ... 1.2 (7 ... 10.3 lb.in)			
Cage Clamp terminals	**Auxiliary conductors**					
(1 or 2 conductors connectable)	• Solid	mm^2	2 x (0.25 ... 2.5)			
	• Finely stranded with end sleeve	mm^2	2 x (0.25 ... 1.5)			
	• Finely stranded without end sleeve	mm^2	2 x (0.25 ... 2.5)			
	• AWG conductors, solid or stranded	AWG	2 x (24 ... 14)			

Contactor	Type Size		3RT10 34 S2	3RT10 35 S2	3RT10 36 S2
General data					
Permissible mounting position The contactors are designed for operation on a vertical mounting surface.	AC and DC operation		 For DC operation and 22.5° inclination towards the front, operating range 0.85 ... 1.1 x U_s		
Upright mounting position:	AC operation		 Special design required.		
	DC operation		--		
Mechanical endurance	Basic units	Operating cycles	10 million		
	Basic unit with snap-on auxiliary switch block		10 million		
	Solid-state compatible auxiliary switch block		5 million		
Electrical endurance			1)		
Rated insulation voltage U_i (pollution degree 3)		V	690		
Rated impulse withstand voltage U_{imp}		kV	6		
Safe isolation Between the coil and the contacts acc. to EN 60947-1, Appendix N		V	400		
Mirror contacts A mirror contact is an auxiliary NC contact that cannot be closed simultaneously with a NO main contact.	3RT10 3., 3RT13 3. (removable auxiliary switch block)		Yes. Acc. to EN 60947-4-1, Appendix F		
	3RT10 3., 3RT13 3. (permanent auxiliary switch block)		Acc. to SUVA requirements on request.		
Permissible ambient temperature	During operation	°C	-25 ... +60		
	During storage	°C	-55 ... +80		
Degree of protection acc. to EN 60947-1, Appendix C			IP20 (terminal enclosure IP00), AC coil assembly IP40, DC coil assembly IP30		
Touch protection acc. to EN 50274			Finger-safe		
Shock resistance					
• Rectangular pulse	AC and DC operation	g/ms	10/5 and 5/10		
• Sine pulse	AC and DC operation	g/ms	15/5 and 8/10		
Conductor cross-sections			2)		

1) See endurance of the main contacts on page 3/16.

2) See conductor cross-sections on page 3/29.

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type Size		3RT10 34 S2	3RT10 35 S2	3RT10 36 S2
Short-circuit protection for contactors without overload relays					
			For short-circuit protection for contactors with overload relays see Protection Equipment: Overload Relays For short-circuit protection for fuseless load feeders see Load Feeders, Motor Starters and Soft Starters: -> 3RA Fuseless Load Feeders.		
Main circuit Fuse links, gL/gG NH 3NA, DIAZED 5SB, NEOZED 5SE					
acc. to IEC 60947-4-1/ EN 60947-4-1	Type of coordination "1" Type of coordination "2" Weld-free [1]	A A A	125 63 16	125 63 16	160 80 50
Auxiliary circuit					
• Fuse links gL/gG DIAZED 5SB, NEOZED 5SE (weld-free protection at $I_k \geq 1$ kA)		A	10		
• Miniature circuit-breakers with C-characteristic (short-circuit current $I_k \leq 400$ A)		A	10		
Control					
Coil operating range	AC/DC		0.8 ... 1.1 x U_s		
Input power of coils (when coil is cold and 1.0 x U_s)					
AC operation, 50 Hz, standard version	• Closing • p.f. • Closed • p.f.	VA VA 	104 0.78 9.7 0.42	145 0.79 12.5 0.36	
AC operation, 50/60 Hz, standard version	• Closing • p.f. • Closed • p.f.	VA VA 	127/113 0.73/0.69 11.3/9.5 0.41/0.42	170/155 0.76/0.72 15/11.8 0.35/0.38	
AC operation, 50 Hz, USA/Canada	• Closing • p.f. • Closed • p.f.	VA VA 	108 0.76 9.6 0.42	150 0.77 12.5 0.35	
AC operation, 60 Hz, USA/Canada	• Closing • p.f. • Closed • p.f.	VA VA 	120 0.7 10.1 0.42	166 0.71 12.6 0.37	
DC operation	Closing = Closed	W	13.3	13.3	
Permissible residual current of the electronics (with 0 signal)					
	• AC operation • DC operation	mA mA	< 12 mA x (230 V/U_s) < 38 mA x (24 V/U_s)	< 18 mA x (230 V/U_s) < 38 mA x (24 V/U_s)	
Operating times for 0.8 ... 1.1 x U_s [2]					
(Total break time = Opening time + Arcing time)					
AC operation	• Closing delay • Opening delay	ms ms	11 ... 30 7 ... 10	10 ... 24 7 ... 10	
DC operation	• Closing delay • Opening delay	ms ms	50 ... 95 20 ... 30	60 ... 100 20 ... 25	
Arcing time		ms	10	10	
Operating times for 1.0 x U_s [2]					
AC operation	• Closing delay • Opening delay	ms ms	13 ... 22 7 ... 10	12 ... 20 7 ... 10	
DC operation	• Closing delay • Opening delay	ms ms	60 ... 75 20 ... 30	70 ... 85 20 ... 25	

1) Test conditions according to IEC 60947-4-1.

2) The opening delay of the NO contact and the closing delay of the NC contact are increased if the contactor coils are attenuated against voltage peaks (varistor +2 ms up to 5 ms, diode assembly: 2 to 6 times).

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor Type Size			3RT10 34 S2	3RT10 35 S2	3RT10 36 S2
Main circuit					
AC capacity					
Utilization category AC-1 **Switching resistive loads**					
Rated operational currents I_e	at 40 °C up to 690 V	A	50	60	60
	at 60 °C up to 690 V	A	45	55	55
Rated output power for AC loads[1] p.f. = 0.95 (for 60 °C)	230 V	kW	18	22	22
	400 V	kW	31	38	38
	500 V	kW	39	46	46
	690 V	kW	54	66	66
Minimum conductor cross-section for loads with I_e	for 40 °C	mm^2	16	16	16
	for 60 °C	mm^2	10	16	16
Utilization category AC-2 and AC-3					
Rated operational currents I_e	up to 500 V	A	32	40	50
	690 V	A	20	24	24
Rated output power for slipring or squirrel-cage motors at 50 Hz and 60 Hz	230 V	kW	7.5	11	15
	400 V	kW	15	18.5	22
	500 V	kW	18.5	22	30
	690 V	kW	18.5	22	22
Thermal load capacity	10 s current[2]	A	320	400	400
Power loss per conducting path	for I_e/AC-3	W	1.8	2.6	5
Utilization category AC-4 (for $I_a = 6 \times I_e$)					
Rated operational current I_e	up to 400 V	A	29	35	41
Rated output power for squirrel-cage motors with 50 Hz and 60 Hz	for 400 V	kW	15	18.5	22
• The following applies to an endurance of about 200000 operating cycles:					
Rated operational currents I_e	up to 400 V	A	15.6	18.5	24
	690 V	A	15.6	18.5	24
Rated output power for squirrel-cage motors with 50 Hz and 60 Hz	230 V	kW	4.7	5.4	7.3
	400 V	kW	8.2	9.5	12.6
	500 V	kW	9.8	11.8	15.8
	690 V	kW	13	15.5	21.8
Utilization category AC-5a **Switching gas discharge lamps, inductive ballast** Per main current path at 230 V					
• Uncorrected, rated output power per lamp/rated operational current per lamp					
	L 18 W/0.37 A	units	122	149	135
	L 36 W/0.43 A	units	105	128	116
	L 58 W/0.67 A	units	67	82	75
• Lead-lag circuit, rated output power per lamp/rated operational current per lamp					
	L 18 W/0.11 A	units	409	500	454
	L 36 W/0.21 A	units	214	262	238
	L 58 W/0.32 A	units	141	172	156
Switching gas discharge lamps with correction Per main current path at 230 V					
• Shunt compensation with inductive ballast, rated output power per lamp/capacitance/ rated operational current per lamp					
	L 18 W/4.5 µF/0.11 A	units	78	98	123
	L 36 W/4.5 µF/0.21 A	units	78	98	123
	L 58 W/7 µF/0.32 A	units	50	63	79
• With solid-state ballast (single lamp)					
	L 18 W/6.8 µF/0.10 A	units	224	280	350
	L 36 W/6.8 µF/0.18 A	units	124	155	194
	L 58 W/10 µF/0.27 A	units	83	104	129
• With solid-state ballast (two lamps)					
	L 18 W/10 µF/0.18 A	units	124	155	194
	L 36 W/10 µF/0.35 A	units	64	80	100
	L 58 W/22 µF/0.52 A	units	43	54	67

1) Industrial furnaces and electric heaters with resistance heating, etc. (increased power consumption on heating up has been taken into account).

2) According to IEC 60947-4-1.
For rated values for various start-up conditions see Protection Equipment: Overload Relays.

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type Size			3RT10 34 S2	3RT10 35 S2	3RT10 36 S2
Main circuit						
AC capacity						
Utilization category AC-5b **Switching incandescent lamps** Per main conducting path at 230/220 V			kW	5.8	7.3	9.1
Utilization category AC-6a **Switching AC transformers**						
Rated operational current I_e						
• For inrush current n = 20	up to 400 V		A	31	36.5	43.2
• For inrush current n = 30	up to 400 V		A	20.7	24.3	28.8
Rated output power P						
For inrush current n = 20	for 230 V		kVA	12.3	14.5	17.2
	400 V		kVA	21.5	25.3	29.9
	500 V		kVA	26.8	31.6	37.4
	690 V		kVA	23.9	28.7	28.7
For inrush current n = 30	230 V		kVA	8.2	9.7	11.5
	400 V		kVA	14.3	16.8	20
	500 V		kVA	17.9	21	24.9
	690 V		kVA	23.9	28.7	28.7
For deviating inrush current factors x, the power must be recalculated as follows $P_x = P_{n30} \cdot 30/x$						
Utilization category AC-6b **Switching low-inductance (low-loss, metallized dielectric) AC capacitors** Ambient temperature 40 °C						
Rated operational currents I_e	up to 400 V		A	29	36	36
Rated output power for single capacitors or banks of capacitors (minimum inductance of 20 µH between capacitors connected in parallel) at 50 Hz, 60 Hz and	for 230 V		kvar	12	15	15
	400 V		kvar	20	25	25
	525 V		kvar	25	33	33
	690 V		kvar	20	25	25
Load rating with DC						
Utilization category DC-1 **Switching resistive loads (L/R < 1ms)**						
Rated operational current I_e (for 60 °C)						
• 1 current path	up to 24 V		A	45	55	55
	60 V		A	20	23	23
	110 V		A	4.5	4.5	4.5
	220 V		A	1	1	1
	440 V		A	0.4	0.4	0.4
	600 V		A	0.25	0.25	0.25
• 2 current paths in series	up to 24 V		A	45	55	55
	60 V		A	45	45	45
	110 V		A	25	25	25
	220 V		A	5	5	5
	440 V		A	1	1	1
	600 V		A	0.8	0.8	0.8
• 3 current paths in series	up to 24 V		A	45	55	55
	60 V		A	45	55	55
	110 V		A	45	55	55
	220 V		A	45	45	45
	440 V		A	2.9	2.9	2.9
	600 V		A	1.4	1.4	1.4
Utilization category DC-3 and DC-5 **Shunt-wound and series-wound motors (L/R ≤ 15 ms)**						
Rated operational current I_e (for 60 °C)						
• 1 current path	up to 24 V		A	35	35	35
	60 V		A	6	6	6
	110 V		A	2.5	2.5	2.5
	220 V		A	1	1	1
	440 V		A	0.1	0.1	0.1
	600 V		A	0.06	0.06	0.06
• 2 current paths in series	up to 24 V		A	45	55	55
	60 V		A	45	45	45
	110 V		A	25	25	25
	220 V		A	5	5	5
	440 V		A	0.27	0.27	0.27
	600 V		A	0.16	0.16	0.16
• 3 current paths in series	up to 24 V		A	45	55	55
	60 V		A	45	55	55
	110 V		A	45	55	55
	220 V		A	25	25	25
	440 V		A	0.6	0.6	0.6
	600 V		A	0.35	0.35	0.35

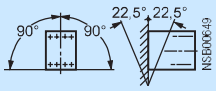
3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor / Type / Size			3RT10 34 S2	3RT10 35 S2	3RT10 36 S2
Operating frequency					
Operating frequency z in operating cycles/hour					
• Contactors without overload relays	No-load operating frequency AC	h^{-1}	5000	5000	5000
	No-load operating frequency DC	h^{-1}	1500	1500	1500
Dependence of the operating frequency z' on the operational current *I'* and operational voltage *U'*: $z' = z \cdot (I_e/I') \cdot (400\ V/U')^{1.5} \cdot 1/h$	AC-1 (AC/DC)	h^{-1}	1200	1200	1000
	AC-2 (AC/DC)	h^{-1}	750	600	400
	AC-3 (AC/DC)	h^{-1}	1000	1000	800
	AC-4 (AC/DC)	h^{-1}	250	300	300
• Contactors with overload relays (mean value)		h^{-1}	15	15	15

Contactor / Type / Size			3RT10 3 . S2
Conductor cross-sections			
Screw terminals (1 or 2 conductors connectable)	**Main conductors:** With box terminal		
Front clamping point connected  NSB00479	• Finely stranded with end sleeve	mm^2	0.75 ... 25
	• Finely stranded without end sleeve	mm^2	0.75 ... 25
	• Stranded	mm^2	0.75 ... 35
	• Solid	mm^2	0.75 ... 16
	• Ribbon cable conductors (number x width x circumference)	mm	6 x 9 x 0.8
	• AWG conductors, solid or stranded	AWG	18 ... 2
Rear clamping point connected  NSB00480	• Finely stranded with end sleeve	mm^2	0.75 ... 25
	• Finely stranded without end sleeve	mm^2	0.75 ... 25
	• Stranded	mm^2	0.75 ... 35
	• Solid	mm^2	0.75 ... 16
	• Ribbon cable conductors (number x width x circumference)	mm	6 x 9 x 0.8
	• AWG conductors, solid or stranded	AWG	18 ... 2
Both clamping points connected  NSB00481	• Finely stranded with end sleeve	mm^2	2 x (0.75 ... 16)
	• Finely stranded without end sleeve	mm^2	2 x (0.75 ... 16)
	• Stranded	mm^2	2 x (0.75 ... 25)
	• Solid	mm^2	2 x (0.75 ... 16)
	• Ribbon cable conductors (number x width x circumference)	mm	2 x (6 x 9 x 0.8)
	• AWG conductors, solid or stranded	AWG	2 x (18 ... 2)
	• Terminal screw		M6 (Pozidriv size 2)
	- Tightening torque	Nm	3 ... 4.5 (27 ... 40 lb.in)
	Auxiliary conductors:		
	• Solid	mm^2	2 x (0.5 ... 1.5) 2 x (0.75 ... 2.5) acc. to IEC 60947; max. 2 x (0.75 ... 4)
	• Finely stranded with end sleeve	mm^2	2 x (0.5 ... 1.5) 2 x (0.75 ... 2.5)
	• AWG conductors, solid or stranded	AWG	2 x (20 ... 16) 2 x (18 ... 14) 1 x 12
	• Terminal screw		M3
	- Tightening torque	Nm	0.8 ... 1.2 (7 ... 10.3 lb.in)
Cage Clamp terminals (1 or 2 conductors connectable)	**Auxiliary conductors:**		
	• Solid	mm^2	2 x (0.25 ... 2.5)
	• Finely stranded with end sleeve	mm^2	2 x (0.25 ... 1.5)
	• Finely stranded without end sleeve	mm^2	2 x (0.25 ... 2.5)
	• AWG conductors, solid or stranded		2 x (24 ... 14)

For tools for opening Cage Clamp terminals see Catalog LV 1, Chapter 3, Accessories and Spare Parts.
Max. outer diameter of conductor insulation: 3.6 mm.
With conductor cross-sections ≤ 1 mm² an "insulation stop" must be used, see Catalog LV 1, Chapter 3, Accessories and Spare Parts.

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactors	Type Size		3RT10 44 S3	3RT10 45 S3	3RT10 46 S3
General data					
Permissible mounting position The contactors are designed for operation on a vertical mounting surface.	AC and DC operation		 For DC operation and 22.5° inclination towards the front, operating range 0.85 ... 1.1 x U_s		
Upright mounting position:	AC operation				
	DC operation		Special design required. --		
Mechanical endurance	Basic units	Operating cycles	10 million		
	Basic unit with snap-on auxiliary switch block		10 million		
	Solid-state compatible auxiliary switch block		5 million		
Electrical endurance			1)		
Rated insulation voltage U_i (pollution degree 3)		V	1000		
Rated impulse withstand voltage U_{imp}		kV	6		
Safe isolation Between the coil and the contacts acc. to EN 60947-1, Appendix N		V	690		
Mirror contacts A mirror contact is an auxiliary NC contact that cannot be closed simultaneously with a NO main contact.	3RT10 4., 3RT13 4., 3RT14 4. (removable auxiliary switch block)		Yes. Acc. to EN 60947-4-1, Appendix F		
	3RT10 4., 3RT13 4., 3RT14 4. (permanent auxiliary switch block)		Acc. to SUVA requirements on request.		
Permissible ambient temperature	During operation	°C	-25 ... +60		
	During storage	°C	-55 ... +80		
Degree of protection acc. to EN 60947-1, Appendix C			IP20 (terminal enclosure IP00), AC coil assembly IP40, DC coil assembly IP30		
Touch protection acc. to EN 50274			Finger-safe		
Shock resistance					
• Rectangular pulse	AC and DC operation	g/ms	6.8/5 and 4/10		
• Sine pulse	AC and DC operation	g/ms	10.6/5 and 6.2/10		
Conductor cross-sections			2)		
Short-circuit protection for contactors without overload relays					
Main circuit			For short-circuit protection for contactors with overload relays see Protection Equipment: Overload Relays For short-circuit protection for fuseless load feeders see Load Feeders, Motor Starters and Soft Starters: -> 3RA Fuseless Load Feeders.		
• Fuse links gL/gG NH 3NA, DIAZED 5SB, NEOZED 5SE					
- Acc. to IEC 60947-4-1/ EN 60947-4-1	Type of coordination "1"	A	250	250	
	Type of coordination "2"	A	125	160	
	Weld-free[3]	A	63	100	
Auxiliary circuit					
• Fuse links gL/gG DIAZED 5SB, NEOZED 5SE (weld-free protection at $I_k \geq 1$ kA)		A	10		
• Miniature circuit-breakers with C-characteristic (short-circuit current $I_k < 400$ A)		A	10		

1) See endurance of the main contacts on page 3/16.

2) See conductor cross-sections on page 3/34.

3) Test conditions according to IEC 60947-4-1.

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type Size		3RT10 44 S3	3RT10 45 S3	3RT10 46 S3
Control					
Coil operating range	AC/DC		0.8 ... 1.1 x U_s		
Input power of coils (when coil is cold and 1.0 x U_s)					
AC operation, 50 Hz, standard version	• Closing • p.f. • Closed • p.f.	VA VA 	218 0.61 21 0.26	270 0.68 22 0.27	
AC operation, 50/60 Hz, standard version	• Closing • p.f. • Closed • p.f.	VA VA 	247/211 0.62/0.57 25/18 0.27/0.3	298/274 0.7/0.62 27/20 0.29/0.31	
AC operation, 50 Hz, USA/Canada	• Closing • p.f. • Closed • p.f.	VA VA 	218 0.61 21 0.26	270 0.68 22 0.27	
AC operation, 60 Hz, USA/Canada	• Closing • p.f. • Closed • p.f.	VA VA 	232 0.55 20 0.28	300 0.52 21 0.29	
DC operation	Closing = Closed	W	15	15	
Permissible residual current of the electronics (with 0 signal)					
	• AC operation • DC operation		< 25 mA x (230 V/U_s) < 43 mA x (24 V/U_s)		
Operating times for 0.8 ... 1.1 x U_s [1] Total break time = Opening delay + Arcing time					
• AC operation	Closing delay Opening delay	ms ms	16 ... 57 10 ... 19	17 ... 90 10 ... 25	
• DC operation	Closing delay Opening delay	ms ms	90 ... 230 14 ... 20	90 ... 230 14 ... 20	
• Arcing time		ms	10 ... 15	10 ... 15	
Operating times for 1.0 x U_s [1]					
• AC operation	Closing delay Opening delay	ms ms	18 ... 34 11 ... 18	18 ... 30 11 ... 23	
• DC operation	Closing delay Opening delay	ms ms	100 ... 120 16 ... 20	100 ... 120 16 ... 20	

1) The opening delay of the NO contact and the closing delay of the NC contact are increased if the contactor coils are attenuated against voltage peaks (varistor +2 ms up to 5 ms, diode assembly: 2 to 6 times).

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type / Size			3RT10 44 S3	3RT10 45 S3	3RT10 46 S3
Main circuit						
AC capacity						
Utilization category AC-1 Switching resistive loads						
Rated operational currents I_e	at 40 °C up to 690 V		A	100	120	120
	1000 V		A	50	60	70
	at 60 °C up to 690 V		A	90	100	100
	1000 V		A	40	50	60
Rated output of AC loads[1] p.f. = 0.95 (for 60 °C)	for 230 V		kW	34	38	38
	400 V		kW	59	66	66
	500 V		kW	74	82	82
	690 V		kW	102	114	114
	1000 V		kW	66	82	98
Minimum conductor cross-section for loads with I_e	for 40 °C		mm^2	35	50	50
	for 60 °C		mm^2	35	35	35
Utilization categories AC-2 and AC-3						
Rated operational currents I_e	up to 500 V		A	65	80	95
	690 V		A	47	58	58
	1000 V		A	25	30	30
Rated output power for slipring or squirrel-cage motors at 50 Hz and 60 Hz	for 230 V		kW	18.5	22	22
	400 V		kW	30	37	45
	500 V		kW	37	45	55
	690 V		kW	45	55	55
	1000 V		kW	30	37	37
Thermal load capacity	10 s current[2]		A	600	760	760
Power loss per conducting path	for I_e/AC-3		W	4.6	7.7	10.8
Utilization category AC-4 (for I_a = 6 x I_e)						
Rated operational current I_e	up to 400 V		A	55	66	80
Rated output power for squirrel-cage motors with 50 Hz and 60 Hz	for 400 V		kW	30	37	45
• The following applies to an endurance of about 200 000 operating cycles:						
- Rated operational currents I_e	up to 400 V		A	28	34	42
	690 V		A	28	34	42
	1000 V		A	20	23	23
- Rated output power for squirrel-cage motors with 50 Hz and 60 Hz	for 230 V		kW	8.7	10.4	12
	400 V		kW	15.1	17.9	22
	500 V		kW	18.4	22.4	27
	690 V		kW	25.4	30.9	38
	1000 V		A	22	30	30
Utilization category AC-5a Switching gas discharge lamps, inductive ballast Per main current path at 230 V						
• Uncorrected, rated output power per lamp/rated operational current per lamp						
	L18 W/0.37 A		units	243	270	
	L36 W/0.43 A		units	209	232	
	L58 W/0.67 A		units	134	149	
• Lead-lag circuit, rated output power per lamp/rated operational current per lamp						
	L18 W/0.11 A		units	818	909	
	L36 W/0.21 A		units	428	476	
	L58 W/0.32 A		units	281	312	
Switching gas discharge lamps with correction Per main current path at 230 V						
• Shunt compensation with inductive ballast, rated output power per lamp/capacitance/ rated operational current per lamp						
	L18 W/4.5 µF/0.11 A		units	160	197	234
	L36 W/4.5 µF/0.21 A		units	160	197	234
	L58 W/7 µF/0.32 A		units	103	127	150
• With solid-state ballast (single lamp)						
	L18 W/6.8 µF/0.10 A		units	455	560	665
	L36 W/6.8 µF/0.18 A		units	253	311	369
	L58 W/10 µF/0.27 A		units	168	207	246
• With solid-state ballast (two lamps)						
	L18 W/10 µF/0.18 A		units	253	311	369
	L36 W/10 µF/0.35 A		units	130	160	190
	L58 W/22 µF/0.52 A		units	88	108	128
Utilization category AC-5b Switching incandescent lamps Per main conducting path at 230/220 V			kW	9	14.6	17.3

1) Industrial furnaces and electric heaters with resistance heating, etc. (increased power consumption on heating up has been taken into account).

2) According to IEC 60947-4-1. For rated values for various start-up conditions see Protection Equipment: Overload Relays.

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type Size			3RT10 44 S3	3RT10 45 S3	3RT10 46 S3
Main circuit						
AC capacity						
Utilization category AC-6a **Switching AC transformers**						
Rated operational current I_e (60 °C)						
• For inrush current n = 20	up to 400 V	A		63.5	80	84.4
	up to 690 V	A		47	58	58
• For inrush current n = 30	up to 400 V	A		42.3	56.3	56.3
	up to 690 V	A		42.3	56.3	56.3
Rated output power P						
• For inrush current n = 20	230 V	kVA		25.3	31.9	33.6
	400 V	kVA		43.9	55.4	58
	500 V	kVA		54.9	69.3	73.1
	690 V	kVA		56.2	69.3	69.3
• For inrush current n = 30	230 V	kVA		16.8	22.4	22.4
	400 V	kVA		29.3	39	39
	500 V	kVA		36.6	48.7	48.7
	690 V	kVA		50.3	67.3	67.3
For deviating inrush current factors x, the power must be recalculated as follows $P_x = P_{n30} \cdot 30/x$						
Utilization category AC-6b **Switching low-inductance (low-loss, metallized dielectric) AC capacitors**						
Rated operational current I_e (60 °C)	up to 400 V	A		57	72	
Rated output power for single capacitors or banks of capacitors (minimum inductance of 6 µH between capacitors connected in parallel) at 50 Hz, 60 Hz and	for 230 V	kvar		24	29	
	400 V	kvar		40	50	
	525 V	kvar		50	65	
	690 V	kvar		40	50	
Load rating with DC						
Utilization category DC-1 **Switching resistive load (L/R ≤ 1 ms)**						
Rated operational current I_e (60 °C)						
• 1 current path	up to 24 V	A		90	100	100
	60 V	A		23	60	60
	110 V	A		4.5	9	9
	220 V	A		1	2	2
	440 V	A		0.4	0.6	0.6
	600 V	A		0.26	0.4	0.4
• 2 current paths in series	up to 24 V	A		90	100	100
	60 V	A		90	100	100
	110 V	A		90	100	100
	220 V	A		5	10	10
	440 V	A		1	1.8	1.8
	600 V	A		0.8	1	1
• 3 current paths in series	up to 24 V	A		90	100	100
	60 V	A		90	100	100
	110 V	A		90	100	100
	220 V	A		70	80	80
	440 V	A		2.9	1.8	4.5
	600 V	A		1.4	1	2.6
Utilization category DC-3 and DC-5 **Shunt-wound and series-wound motors (L/R ≤ 15 ms)**						
Rated operational current I_e (60 °C)						
• 1 current path	up to 24 V	A		40	40	40
	60 V	A		6	6.5	6.5
	110 V	A		2.5	2.5	2.5
	220 V	A		1	1	1
	440 V	A		0.15	0.15	0.15
	600 V	A		0.06	0.06	0.06
• 2 current paths in series	up to 24 V	A		90	100	100
	60 V	A		90	100	100
	110 V	A		90	100	100
	220 V	A		7	7	7
	440 V	A		0.42	0.42	0.42
	600 V	A		0.16	0.16	0.16
• 3 current paths in series	up to 24 V	A		90	100	100
	60 V	A		90	100	100
	110 V	A		90	100	100
	220 V	A		35	35	35
	440 V	A		0.8	0.8	0.8
	600 V	A		0.35	0.35	0.35

3RT10 contactors, 3-pole, 3 ... 250 kW

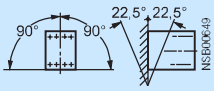
Contactor	Type Size		3RT10 44 S3	3RT10 45 S3	3RT10 46 S3
Main circuit					
Operating frequency					
Operating frequency *z* in operating cycles/hour					
• Contactors without overload relays	No-load operating frequency AC	h^{-1}	5000	5000	5000
	No-load operating frequency DC	h^{-1}	1000	1000	1000
Dependence of the operating frequency *z'* on the operational current *I'* and operational voltage *U'*: $z' = z \cdot (I_e/I') \cdot (400\ V/U')^{1.5} \cdot 1/h$	AC-1 (AC/DC)	h^{-1}	1000	900	900
	AC-2 (AC/DC)	h^{-1}	400	400	350
	AC-3 (AC/DC)	h^{-1}	1000	1000	850
	AC-4 (AC/DC)	h^{-1}	300	300	250
• Contactors with overload relays (mean value)		h^{-1}	15	15	15

Contactor	Type Size		3RT10 4 . S3
Conductor cross-sections			
Screw terminals (1 or 2 conductors connectable)	**Main conductors:** With box terminal		
Front clamping point connected	• Finely stranded with end sleeve	mm^2	2.5 ... 35
	• Finely stranded without end sleeve	mm^2	4 ... 50
	• Solid	mm^2	2.5 ... 16
	• Stranded	mm^2	4 ... 70
	• Ribbon cable conductors (number x width x circumference)	mm	6 x 9 x 0.8
	• AWG conductors, solid or stranded	AWG	10 ... 2/0
Rear clamping point connected	• Finely stranded with end sleeve	mm^2	2.5 ... 50
	• Finely stranded without end sleeve	mm^2	10 ... 50
	• Solid	mm^2	2.5 ... 16
	• Stranded	mm^2	10 ... 70
	• Ribbon cable conductors (number x width x circumference)	mm	6 x 9 x 0.8
	• AWG conductors, solid or stranded	AWG	10 ... 2/0
Both clamping points connected	• Finely stranded with end sleeve	mm^2	2 x (2.5 ... 35)
	• Finely stranded without end sleeve	mm^2	2 x (4 ... 35)
	• Solid	mm^2	2 x (2.5 ... 16)
	• Stranded	mm^2	2 x (4 ... 50)
	• Ribbon cable conductors (number x width x circumference)	mm	2 x (6 x 9 x 0.8)
	• AWG conductors, solid or stranded	AWG	2 x (10 ... 1/0)
	• Terminal screw		M6 (hexagon socket, A/F 4)
	- Tightening torque	Nm	4 ... 6 (36 ... 53 lb.in)
Connection for drilled copper bars[1]	Max. width	mm	10
Without box terminal with cable lugs[2] (1 or 2 conductors connectable)	• Finely stranded with cable lug	mm^2	10 ... 50[3]
	• Stranded with cable lug	mm^2	10 ... 70[3]
	• AWG conductors, solid or stranded	AWG	7 ... 1/0
	Auxiliary conductors:		
	• Solid	mm^2	2 x (0.5 ... 1.5) 2 x (0.75 ... 2.5) acc. to IEC 60947; max. 2 x (0.75 ... 4)
	• Finely stranded with end sleeve	mm^2	2 x (0.5 ... 1.5) 2 x (0.75 ... 2.5)
	• AWG conductors, solid or stranded	AWG	2 x (20 ... 16) 2 x (18 ... 14) 1 x 12
	• Terminal screw		M3
	- Tightening torque	Nm	0.8 ... 1.2 (7 ... 10.3 lb.in)
Cage Clamp terminals (1 or 2 conductors connectable)	**Auxiliary conductors:**		
	• Solid	mm^2	2 x (0.25 ... 2.5)
	• Finely stranded with end sleeve	mm^2	2 x (0.25 ... 1.5)
	• Finely stranded without end sleeve	mm^2	2 x (0.25 ... 2.5)
	• AWG conductors, solid or stranded	AWG	2 x (24 ... 14)

For tools for opening Cage Clamp terminals see Catalog LV 1, Chapter 3, Accessories and Spare Parts.
Maximum outer diameter of the conductor insulation: 3.6 mm.
With conductor cross-sections ≤ 1 mm² an "insulation stop" must be used, see Catalog LV 1, Chapter 3, Accessories and Spare Parts.

1) If bars larger than 12 x 10 mm are connected, a 3RT19 46-4EA1 terminal cover is needed to comply with the phase clearance.
2) When connecting rails which are larger than 25 mm^2, the 3RT19 46-4EA1 cover must be used to keep the phase clearance.
3) Only with crimped cable lugs according to DIN 46234. Cable lug max. 20 mm wide.

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor / Type / Size			3RT10 54 S6	3RT10 55 S6	3RT10 56 S6
General data					
Permissible mounting position The contactors are designed for operation on a vertical mounting surface.					
Mechanical endurance		Operating cycles	10 million		
Electrical endurance			1)		
Rated insulation voltage U_i (pollution degree 3)		V	1 000		
Rated impulse withstand voltage U_{imp}		kV	8		
Safe isolation Between the coil and the contacts acc. to EN 60947-1, Appendix N		V	690		
Mirror contacts A mirror contact is an auxiliary NC contact that cannot be closed simultaneously with a NO main contact.			Yes. Acc. to EN 60947-1, Appendix F		
Permissible ambient temperature	During operation During storage	°C °C	-25 ... +60/+55 with AS-Interface -55 ... +80		
Degree of protection acc. to EN 60947-1, Appendix C **Touch protection** acc. to EN 50274			IP00/open, coil assembly IP20 Finger-safe with cover		
Shock resistance	Rectangular pulse Sine pulse	g/ms g/ms	8.5/5 and 4.2/10 13.4/5 and 6.5/10		
Conductor cross-sections			2)		
Electromagnetic compatibility (EMC)			3)		
Short-circuit protection					
Main circuit Fuse links gL/gG NH 3NA, DIAZED 5SB, NEOZED 5SE			For short-circuit protection for contactors with overload relays see Protection Equipment: Overload Relays		
- Acc. to IEC 60947-4-1/ EN 60947-4-1	• Type of coordination "1" • Type of coordination "2" • Weld-free[4]	A A A	355 315 80	355 315 160	
Auxiliary circuit					
• Fuse links gL/gG DIAZED 5SB, NEOZED 5SE (weld-free protection at $I_k \geq 1$ kA)		A	10		
• Or miniature circuit-breakers with C-characteristic (I_k < 400 A)					

1) See endurance of the main contacts on page 3/16.

2) See conductor cross-sections on page 3/39.

3) See electromagnetic compatibility (EMC) on page 3/9.

4) Test conditions according to IEC 60947-4-1.

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type Size		**3RT10 5.** **S6**
Control			
Operating range of the solenoid AC/DC (UC)			0.8 x $U_{s\ min}$ ... 1.1 x $U_{s\ max}$
Power consumption of the solenoid (when coil is cool and rated range $U_{s\ min}$ ... $U_{s\ max}$)			
• Conventional operating mechanism			
- AC operation	Closing at $U_{s\ min}$	VA/p.f.	250 /0.9
	Closing at $U_{s\ max}$	VA/p.f.	300 /0.9
	Closed at $U_{s\ min}$	VA/p.f.	4.8 /0.8
	Closed at $U_{s\ max}$	VA/p.f.	5.8 /0.8
- DC operation	Closing at $U_{s\ min}$	W	300
	Closing at $U_{s\ max}$	W	360
	Closed at $U_{s\ min}$	W	4.3
	Closed at $U_{s\ max}$	W	5.2
• Solid-state operating mechanism			
- AC operation	Closing at $U_{s\ min}$	VA/p.f.	190 /0.8
	Closing at $U_{s\ max}$	VA/p.f.	280 /0.8
	Closed at $U_{s\ min}$	VA/p.f.	3.5 /0.5
	Closed at $U_{s\ max}$	VA/p.f.	4.4 /0.4
- DC operation	Closing at $U_{s\ min}$	W	250
	Closing at $U_{s\ max}$	W	320
	Closed at $U_{s\ min}$	W	2.3
	Closed at $U_{s\ max}$	W	2.8
PLC control input (EN 61131-2/type 2)			24 V DC/ ≤ 30 mA power consumption, (operating range 17 ... 30 V DC)
Operating times (Total break-time = Opening delay + Arcing time)			
• Conventional operating mechanism			
- with 0.8 x $U_{s\ min}$ ... 1.1 x $U_{s\ max}$	Closing delay	ms	20 ... 95
	Opening delay	ms	40 ... 60
- with $U_{s\ min}$ ... $U_{s\ max}$	Closing delay	ms	25 ... 50
	Opening delay	ms	40 ... 60
• Solid-state operating mechanism, actuated via PLC input			
- with 0.8 x $U_{s\ min}$ ... 1.1 x $U_{s\ max}$	Closing delay	ms	35 ... 75
	Opening delay	ms	80 ... 90
- with $U_{s\ min}$ ... $U_{s\ max}$	Closing delay	ms	40 ... 60
	Opening delay	ms	80 ... 90
• Solid-state operating mechanism, actuated via A1/A2			
- with 0.8 x $U_{s\ min}$ ... 1.1 x $U_{s\ max}$	Closing delay	ms	95 ... 135
	Opening delay	ms	80 ... 90
- with $U_{s\ min}$ ... $U_{s\ max}$	Closing delay	ms	100 ... 120
	Opening delay	ms	80 ... 90
Arcing time		ms	10 ... 15

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor / Type / Size				3RT10 54 S6	3RT10 55 S6	3RT10 56 S6
Main circuit						
AC capacity						
Utilization category AC-1 Switching resistive loads						
Rated operational currents I_e	at 40 °C up to 690 V	A		160	185	215
	at 60 °C up to 690 V	A		140	160	185
	at 60 °C up to 1000 V	A		80	90	100
Rated output power for AC loads[1] p.f. = 0.95 (for 60 °C)	for 230 V	kW		53	60	70
	400 V	kW		92	105	121
	500 V	kW		115	131	152
	690 V	kW		159	181	210
	1000 V	kW		131	148	165
Minimum conductor cross-section for loads with I_e	for 40 °C	mm^2		70	95	95
	for 60 °C	mm^2		50	70	95
Utilization category AC-2 and AC-3						
Rated operational currents I_e	up to 500 V	A		115	150	185
	690 V	A		115	150	170
	1000 V	A		53	65	65
Rated output power for slipring or squirrel-cage motors at 50 Hz and 60 Hz	for 230 V	kW		37	50	61
	400 V	kW		64	84	104
	500 V	kW		81	105	132
	690 V	kW		113	146	167
	1000 V	kW		75	90	90
Thermal load capacity	10 s current[2]	A		1100	1300	1480
Power loss per main conducting path	for I_e/AC-3/500 V	W		7	9	13
Utilization category AC-4 (for $I_a = 6 \times I_e$)						
Rated operational current I_e	up to 400 V	A		97	132	160
Rated output power for squirrel-cage motors with 50 Hz and 60 Hz	for 400 V	kW		55	75	90
• The following applies to an endurance of about 200 000 operating cycles:						
- Rated operational currents I_e	up to 500 V	A		54	68	81
	690 V	A		48	57	65
	1000 V	A		34	38	42
- Rated output power for squirrel-cage motors with 50 Hz and 60 Hz	for 230 V	kW		16	20	25
	400 V	kW		29	38	45
	500 V	kW		37	47	57
	690 V	kW		48	55	65
	1000 V	kW		49	55	60
Utilization category AC-6a Switching AC transformers						
Rated operational current I_e						
• For inrush current n = 20	up to 690 V	A		115	148	148
• For inrush current n = 30	up to 690 V	A		90	99	99
Rated output power P						
• For inrush current n = 20	for 230 V	kVA		45	58	58
	400 V	kVA		79	102	102
	500 V	kVA		99	128	128
	690 V	kVA		137	176	176
	1000 V	kVA		80	98	117
• For inrush current n = 30	for 230 V	kVA		35	39	39
	400 V	kVA		62	68	68
	500 V	kVA		77	85	85
	690 V	kVA		107	118	118
	1000 V	kVA		80	98	117
For deviating inrush current factors x, the power must be recalculated as follows: $P_x = P_{n\,30} \cdot 30/x$						
Utilization category AC-6b Switching low-inductance (low-loss, metallized dielectric) AC capacitors Ambient temperature 40 °C						
Rated operational currents I_e	up to 500 V	A		105	125	145
Rated output power for single capacitors or banks of capacitors (minimum inductance of 6 µH between capacitors connected in parallel) at 50 Hz, 60 Hz	for 230 V	kvar		42	50	58
	400 V	kvar		72	86	100
	500 V	kvar		90	108	125
	690 V	kvar		72	86	100

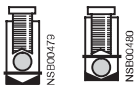
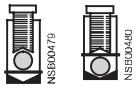
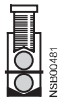
1) Industrial furnaces and electric heaters with resistance heating, etc. (increased power consumption on heating up has been taken into account).

2) According to IEC 60947-4-1. For rated values for various start-up conditions see Protection Equipment: Overload Relays.

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor / Type / Size				3RT10 54 S6	3RT10 55 S6	3RT10 56 S6
Main circuit						
Load rating with DC						
Utilization category DC-1 Switching resistive load (L/R ≤ 1 ms)						
Rated operational current I_e (for 60 °C)						
• 1 current path	up to 24 V	A		160		
	60 V	A		160		
	110 V	A		18		
	220 V	A		3.4		
	440 V	A		0.8		
	600 V	A		0.5		
• 2 current paths in series	up to 24 V	A		160		
	60 V	A		160		
	110 V	A		160		
	220 V	A		20		
	440 V	A		3.2		
	600 V	A		1.6		
• 3 current paths in series	up to 24 V	A		160		
	60 V	A		160		
	110 V	A		160		
	220 V	A		160		
	440 V	A		11.5		
	600 V	A		4		
Utilization category DC-3 and DC-5 Shunt-wound and series-wound motors (L/R ≤ 15 ms)						
Rated operational current I_e (for 60 °C)						
• 1 current path	up to 24 V	A		160		
	60 V	A		7.5		
	110 V	A		2.5		
	220 V	A		0.6		
	440 V	A		0.17		
	600 V	A		0.12		
• 2 current paths in series	up to 24 V	A		160		
	60 V	A		160		
	110 V	A		160		
	220 V	A		2.5		
	440 V	A		0.65		
	600 V	A		0.37		
• 3 current paths in series	up to 24 V	A		160		
	60 V	A		160		
	110 V	A		160		
	220 V	A		160		
	440 V	A		1.4		
	600 V	A		0.75		
Switching frequency						
Operating frequency z in operating cycles/hour						
• Contactors without overload relays	No-load operating frequency		h^{-1}	2000	2000	
Dependence of the operating frequency z' on the operational current I' and operational voltage U': $z' = z \cdot (I_e/I') \cdot (400\ V/U')^{1.5} \cdot 1/h$	AC-1		h^{-1}	800	800	
	AC-2		h^{-1}	400	300	
	AC-3		h^{-1}	1000	750	
	AC-4		h^{-1}	130	130	
• Contactors with overload relays (mean value)			h^{-1}	60	60	

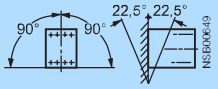
3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type Size		**3RT10 5. S6**
Conductor cross-sections of main conductors with box terminal			
Screw terminals (1 or 2 conductors connectable)	**Main conductors:** With 3RT19 55-4G box terminal (55 kW)		
Front or rear clamping point connected  	• Finely stranded with end sleeve	mm^2	16 ... 70
	• Finely stranded without end sleeve	mm^2	16 ... 70
	• Stranded	mm^2	16 ... 70
	• Ribbon cable conductors (number x width x circumference)	mm	Min. 3 x 9 x 0.8, max. 6 x 15.5 x 0.8
	• AWG conductors, solid or stranded	AWG	6 ... 2/0
Both clamping points connected  	• Finely stranded with end sleeve	mm^2	Max. 1 x 50, 1 x 70
	• Finely stranded without end sleeve	mm^2	Max. 1 x 50, 1 x 70
	• Stranded	mm^2	Max. 2 x 70
	• Ribbon cable conductors (number x width x circumference)	mm	Max. 2 x (6 x 15.5 x 0.8)
	• AWG conductors, solid or stranded	AWG	Max. 2 x 1/0
	• Terminal screw - Tightening torque	 Nm	M10 (hexagon socket, A/F 4) 10 ... 12 (90 ... 110 lb.in)
Screw terminals (1 or 2 conductors connectable)	**Main conductors**: With 3RT19 56-4G box terminal		
Front or rear clamping point connected  	• Finely stranded with end sleeve	mm^2	16 ... 120
	• Finely stranded without end sleeve	mm^2	16 ... 120
	• Stranded	mm^2	16 ... 120
	• Ribbon cable conductors (number x width x circumference)	mm	Min. 3 x 9 x 0.8, max. 10 x 15.5 x 0.8
	• AWG conductors, solid or stranded	AWG	6 ... 250 kcmil
Both clamping points connected  	• Finely stranded with end sleeve	mm^2	Max. 1 x 95, 1 x 120
	• Finely stranded without end sleeve	mm^2	Max. 1 x 95, 1 x 120
	• Stranded	mm^2	Max. 2 x 120
	• Ribbon cable conductors (number x width x circumference)	mm	Max. 2 x (10 x 15.5 x 0.8)
	• AWG conductors, solid or stranded	AWG	Max. 2 x 3/0
	• Terminal screw - Tightening torque	 Nm	M10 (hexagon socket, A/F 4) 10 ... 12 (90 ... 110 lb.in)
Screw terminals	**Main conductors:** Without box terminal/rail connection		
	• Finely stranded with cable lug[1)]	mm^2	16 ... 95
	• Stranded with cable lug[1)]	mm^2	25 ... 120
	• AWG conductors, solid or stranded	AWG	4 ... 250 kcmil
	• Connecting bar (max. width)	mm	17
	• Terminal screw - Tightening torque	 Nm	M8 x 25 (A/F 13) 10 ... 14 (89 ... 124 lb.in)
	Auxiliary conductors:		
	• Solid	mm^2	2 x (0.5 ... 1.5) 2 x (0.75 ... 2.5) acc. to IEC 60947; max. 2 x (0.75 ... 4)
	• Finely stranded with end sleeve	mm^2	2 x (0.5 ... 1.5) 2 x (0.75 ... 2.5)
	• AWG conductors, solid or stranded	AWG	2 x (18 ... 14)
	• Terminal screw - Tightening torque	 Nm	M3 (PZ 2) 0.8 ... 1.2 (7 ... 10.3 lb.in)
Cage Clamp terminals	**Auxiliary conductors:**		
	• Solid	mm^2	2 x (0.25 ... 2.5)
	• Finely stranded with end sleeve	mm^2	2 x (0.25 ... 1.5)
	• Finely stranded without end sleeve	mm^2	2 x (0.25 ... 2.5)
	• AWG conductors, solid or stranded	AWG	2 x (24 ... 14)

For tools for opening Cage Clamp terminals see Catalog LV 1, Chapter 3, Accessories and Spare Parts.
Maximum outer diameter of the conductor insulation: 3.6 mm.
With conductor cross-sections ≤ 1 mm² an "insulation stop" must be used, see Catalog LV 1, Chapter 3, Accessories and Spare Parts.

1) When connecting cable lugs to DIN 46235 use 3RT19 56-4EA1 terminal cover for conductor cross-sections from 95 mm^2 to ensure phase spacing.

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type Size		3RT10 64 S10	3RT10 65 S10	3RT10 66 S10
General data					
Permissible mounting position The contactors are designed for operation on a vertical mounting surface.					
Mechanical endurance		Operating cycles	10 million		
Electrical endurance			1)		
Rated insulation voltage U_i (pollution degree 3)		V	1000		
Rated impulse withstand voltage U_{imp}		kV	8		
Safe isolation Between the coil and the contacts acc. to EN 60947-1, Appendix N		V	690		
Mirror contacts A mirror contact is an auxiliary NC contact that cannot be closed simultaneously with a NO main contact.			Yes. Acc. to EN 60947-4-1, Appendix F		
Permissible ambient temperature	During operation During storage	°C °C	-25 ... +60/+55 with AS-Interface -55 ... +80		
Degree of protection acc. to EN 60947-1, Appendix C **Touch protection** acc. to EN 50274			IP00/open, coil assembly IP20 Finger-safe with cover		
Shock resistance	Rectangular pulse Sine pulse	g/ms g/ms	8.5/5 and 4.2/10 13.4/5 and 6.5/10		
Conductor cross-sections			2)		
Electromagnetic compatibility (EMC)			3)		
Short-circuit protection					
Main circuit Fuse links gL/gG NH 3NA, DIAZED 5SB, NEOZED 5SE					
- Acc. to IEC 60947-4-1/ EN 60947-4-1	• Type of coordination "1" • Type of coordination "2" • Weld-free[4]	A A A	500 400 250		
Auxiliary circuit					
• Fuse links gL/gG DIAZED 5SB, NEOZED 5SE (weld-free protection at $I_k \geq 1$ kA) or miniature circuit-breakers with C-characteristic (short-circuit current $I_k < 400$ A)		A	10		

1) See endurance of the main contacts on page 3/16.
2) See conductor cross-sections on page 3/44.
3) See electromagnetic compatibility (EMC) on page 3/9.
4) Test conditions according to IEC 60947-4-1.

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor Type Size			3RT10 64 S10	3RT10 65 S10	3RT10 66 S10
Control					
Operating range of the solenoid AC/DC (UC)			0.8 x $U_{s\,min}$ ... 1.1 x $U_{s\,max}$		
Power consumption of the solenoid (when coil is cool and rated range $U_{s\,min}$ ... $U_{s\,max}$)					
• Conventional operating mechanism					
- AC operation	Closing at $U_{s\,min}$	VA/p.f.	490 /0.9		
	Closing at $U_{s\,max}$	VA/p.f.	590 /0.9		
	Closed at $U_{s\,min}$	VA/p.f.	5.6 /0.9		
	Closed at $U_{s\,max}$	VA/p.f.	6.7 /0.9		
- DC operation	Closing at $U_{s\,min}$	W	540		
	Closing at $U_{s\,max}$	W	650		
	Closed at $U_{s\,min}$	W	6.1		
	Closed at $U_{s\,max}$	W	7.4		
• Solid-state operating mechanism					
- AC operation	Closing at $U_{s\,min}$	VA/p.f.	400 /0.8		
	Closing at $U_{s\,max}$	VA/p.f.	530 /0.8		
	Closed at $U_{s\,min}$	VA/p.f.	4 /0.5		
	Closed at $U_{s\,max}$	VA/p.f.	5 /0.4		
- DC operation	Closing at $U_{s\,min}$	W	440		
	Closing at $U_{s\,max}$	W	580		
	Closed at $U_{s\,min}$	W	3.2		
	Closed at $U_{s\,max}$	W	3.8		
PLC control input (EN 61131-2/type 2)			24 V DC/ ≤ 30 mA power consumption, (operating range 17 ... 30 V DC)		
Operating times (Total break-time = Opening delay + Arcing time)					
• Conventional operating mechanism					
- with 0.8 x $U_{s\,min}$ ... 1.1 x $U_{s\,max}$	Closing delay	ms	30 ... 95		
	Opening delay	ms	40 ... 80		
- for $U_{s\,min}$ ... $U_{s\,max}$	Closing delay	ms	35 ... 50		
	Opening delay	ms	50 ... 80		
• Solid-state operating mechanism, actuated via A1/A2					
- with 0.8 x $U_{s\,min}$ ... 1.1 x $U_{s\,max}$	Closing delay	ms	105 ... 145		
	Opening delay	ms	80 ... 100		
- for $U_{s\,min}$ ... $U_{s\,max}$	Closing delay	ms	110 ... 130		
	Opening delay	ms	80 ... 100		
• Solid-state operating mechanism, actuated via PLC input					
- with 0.8 x $U_{s\,min}$ ... 1.1 x $U_{s\,max}$	Closing delay	ms	45 ... 80		
	Opening delay	ms	80 ... 100		
- for $U_{s\,min}$ ... $U_{s\,max}$	Closing delay	ms	50 ... 65		
	Opening delay	ms	80 ... 100		
• Arcing time		ms	10 ... 15		

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type Size			3RT10 64 S10	3RT10 65 S10	3RT10 66 S10
Main circuit						
AC capacity						
Utilization category AC-1 **Switching resistive loads**						
Rated operational currents I_e	at 40 °C up to 690 V		A	275	330	
	at 60 °C up to 690 V		A	250	300	
	at 60 °C up to 1000 V		A	100	150	
Rated power output for AC loads[1] p.f. = 0.95 (for 60 °C)	for 230 V		kW	94	113	
	400 V		kW	164	197	
	500 V		kW	205	246	
	690 V		kW	283	340	
	1000 V		kW	164	246	
Minimum conductor cross-section for loads with I_e	for 40 °C		mm^2	150	185	
	for 60 °C		mm^2	120	185	
Utilization category AC-2 and AC-3						
Rated operational currents I_e	up to 500 V		A	225	265	300
	690 V		A	225	265	280
	1000 V		A	68	95	95
Rated output power for slipring or squirrel-cage motors at 50 Hz and 60 Hz	for 230 V		kW	73	85	97
	400 V		kW	128	151	171
	500 V		kW	160	189	215
	690 V		kW	223	265	280
	1000 V		kW	90	132	132
Thermal load capacity	10 s current[2]		A	1800	2400	2400
Power loss per main conducting path	for I_e/AC-3/500 V		W	17	18	22
Utilization category AC-4 (for $I_a = 6 \times I_e$)						
Rated operational current I_e	up to 400 V		A	195	230	280
Rated output power for squirrel-cage motors with 50 Hz and 60 Hz	for 400 V		kW	110	132	160
• The following applies to an endurance of about 200 000 operating cycles:						
- Rated operational currents I_e	up to 500 V		A	96	117	125
	690 V		A	85	105	115
	1000 V		A	42	57	57
- Rated output power for squirrel-cage motors with 50 Hz and 60 Hz	for 230 V		kW	30	37	40
	400 V		kW	54	66	71
	500 V		kW	67	82	87
	690 V		kW	82	102	112
	1000 V		kW	59	80	80
Utilization category AC-6a **Switching AC transformers**						
Rated operational current I_e						
• For inrush current n = 20	up to 690 V		A	227	265	273
• For inrush current n = 30	up to 690 V		A	151	182	182
Rated output power *P*						
• For inrush current n = 20	for 230 V		kVA	90	105	109
	400 V		kVA	157	183	189
	500 V		kVA	196	229	236
	690 V		kVA	271	317	326
	1000 V		kVA	117	164	164
• For inrush current n = 30	for 230 V		kVA	60	72	72
	400 V		kVA	105	126	126
	500 V		kVA	130	158	158
	690 V		kVA	180	217	217
	1000 V		kVA	117	164	164
For deviating inrush current factors x, the power must be recalculated as follows: $P_x = P_{n\,30} \cdot 30/x$						
Utilization category AC-6b **Switching low-inductance (low-loss, metallized dielectric) AC capacitors** Ambient temperature 40 °C						
Rated operational currents I_e	up to 500 V		A	183	220	
Rated output power for single capacitors or banks of capacitors (minimum inductance of 6 µH between capacitors connected in parallel) at 50 Hz, 60 Hz and	for 230 V		kvar	73	88	
	400 V		kvar	127	152	
	500 V		kvar	159	191	
	690 V		kvar	127	152	

1) Industrial furnaces and electric heaters with resistance heating, etc. (increased power consumption on heating up has been taken into account).

2) According to IEC 60947-4-1.
For rated values for various start-up conditions see Protection Equipment: Overload Relays.

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type Size			3RT10 64 S10	3RT10 65 S10	3RT10 66 S10
Main circuit						
Load rating with DC						
Utilization category DC-1 **Switching resistive load (L/R ≤ 1 ms)**						
Rated operational current I_e (for 60 °C)						
• 1 current path	up to 24 V	A		200	300	
	60 V	A		200	300	
	110 V	A		18	33	
	220 V	A		3.4	3.8	
	440 V	A		0.8	0.9	
	600 V	A		0.5	0.6	
• 2 current paths in series	up to 24 V	A		200	300	
	60 V	A		200	300	
	110 V	A		200	300	
	220 V	A		20	300	
	440 V	A		3.2	4	
	600 V	A		1.6	2	
• 3 current paths in series	up to 24 V	A		200	300	
	60 V	A		200	300	
	110 V	A		200	300	
	220 V	A		200	300	
	440 V	A		11.5	11	
	600 V	A		4	5.2	
Utilization category DC-3 and DC-5 **Shunt-wound and series-wound motors (L/R ≤ 15 ms)**						
Rated operational current I_e (for 60 °C)						
• 1 current path	up to 24 V	A		200	300	
	60 V	A		7.5	11	
	110 V	A		2.5	3	
	220 V	A		0.6	0.6	
	440 V	A		0.17	0.18	
	600 V	A		0.12	0.125	
• 2 current paths in series	up to 24 V	A		200	300	
	60 V	A		200	300	
	110 V	A		200	300	
	220 V	A		2.5	2.5	
	440 V	A		0.65	0.65	
	600 V	A		0.37	0.37	
• 3 current paths in series	up to 24 V	A		200	300	
	60 V	A		200	300	
	110 V	A		200	300	
	220 V	A		200	300	
	440 V	A		1.4	1.4	
	600 V	A		0.75	0.75	
Switching frequency						
Operating frequency *z* in operating cycles/hour						
• Contactors without overload relays	No-load operating frequency		h^{-1}	2000	2000	2000
Dependence of the operating frequency *z'* on the operational current *I'* and operational voltage *U'*: $z' = z \cdot (I_e/I') \cdot (400\ V/U')^{1.5} \cdot 1/h$		AC-1	h^{-1}	750	800	750
		AC-2	h^{-1}	250	300	250
		AC-3	h^{-1}	500	700	500
		AC-4	h^{-1}	130	130	130
• Contactors with overload relays (mean value)			h^{-1}	60	60	60

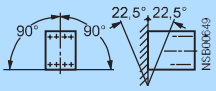
3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type Size		**3RT10 6. S10**
Conductor cross-sections			
Screw terminals	**Main conductors:** With 3RT19 66-4G box terminal		
Front clamping point connected  	• Finely stranded with end sleeve	mm²	70 ... 240
	• Finely stranded without end sleeve	mm²	70 ... 240
	• Stranded	mm²	95 ... 300
	• AWG conductors, solid or stranded	AWG	3/0 ... 600 kcmil
	• Ribbon cable conductors (number x width x circumference)	mm	Min. 6 x 9 x 0.8, max. 20 x 24 x 0.5
Rear clamping point connected  	• Finely stranded with end sleeve	mm²	120 ... 185
	• Finely stranded without end sleeve	mm²	120 ... 185
	• Stranded	mm²	120 ... 240
	• AWG conductors, solid or stranded	AWG	250 ... 500 kcmil
	• Ribbon cable conductors (number x width x circumference)	mm	Min. 6 x 9 x 0.8, max. 20 x 24 x 0.5
Both clamping points connected  	• Finely stranded with end sleeve	mm²	Min. 2 x 50, max. 2 x 185
	• Finely stranded without end sleeve	mm²	Min. 2 x 50, max. 2 x 185
	• Stranded	mm²	Min. 2 x 70, max. 2 x 240
	• AWG conductors, solid or stranded	AWG	Min. 2 x 2/0, max. 2 x 500 kcmil
	• Ribbon cable conductors (number x width x circumference)	mm	Max. 2 x (20 x 24 x 0.5)
	• Terminal screws		M12 (hexagon socket, A/F 5)
	- Tightening torque	Nm	20 ... 22 (180 ... 195 lb.in)
Screw terminals	**Main conductors:** Without box terminal/rail connection		
	• Finely stranded with cable lug[1]	mm²	50 ... 240
	• Stranded with cable lug[1]	mm²	70 ... 240
	• AWG conductors, solid or stranded	AWG	2/0 ... 500 kcmil
	• Connecting bar (max. width)	mm	25
	• Terminal screws		M10 x 30 (A/F 17)
	- Tightening torque	Nm	14 ... 24 (124 ... 210 lb.in)
	Auxiliary conductors:		
	• Solid	mm²	2 x (0.5 ... 1.5) 2 x (0.75 ... 2.5) acc. to IEC 60947; max. 2 x (0.75 ... 4)
	• Finely stranded with end sleeve	mm²	2 x (0.5 ... 1.5) 2 x (0.75 ... 2.5)
	• AWG conductors, solid or stranded	AWG	2 x (18 ... 14)
	• Terminal screws		M3 (PZ 2)
	- Tightening torque	Nm	0.8 ... 1.2 (7 ... 10.3 lb.in)
Cage Clamp terminals	**Auxiliary conductors:**		
	• Solid	mm²	2 x (0.25 ... 2.5)
	• Finely stranded with end sleeve	mm²	2 x (0.25 ... 1.5)
	• Finely stranded without end sleeve	mm²	2 x (0.25 ...2.5)
	• AWG conductors, solid or stranded	AWG	2 x (24 ... 14)

For tools for opening Cage Clamp terminals see Catalog LV 1, Chapter 3, Accessories and Spare Parts.
Maximum outer diameter of the conductor insulation: 3.6 mm.
With conductor cross-sections ≤ 1 mm² an "insulation stop" must be used, see Catalog LV 1, Chapter 3, Accessories and Spare Parts.

1) When connecting cable lugs to DIN 46234, the 3RT19 66-4EA1 terminal cover must be used for conductor cross-sections of 240 mm² and more as well as DIN 46235 for conductor cross-sections of 185 mm² and more to keep the phase clearance.

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type Size		3RT10 75 S12	3RT10 76 S12
General data				
Permissible mounting position The contactors are designed for operation on a vertical mounting surface.				
Mechanical endurance		Operating cycles	10 million	
Electrical endurance			1)	
Rated insulation voltage U_i (pollution degree 3)		V	1000	
Rated impulse withstand voltage U_{imp}		kV	8	
Safe isolation Between the coil and the contacts acc. to EN 60947-1, Appendix N		V	690	
Mirror contacts A mirror contact is an auxiliary NC contact that cannot be closed simultaneously with a NO main contact.			Yes. Acc. to EN 60947-1, Appendix F	
Permissible ambient temperature	During operation During storage	°C °C	-25 ... +60/+55 with AS-Interface -55 ... +80	
Degree of protection acc. to EN 60947-1, Appendix C **Touch protection** acc. to EN 50274			IP00/open, coil assembly IP20 Finger-safe with cover	
Shock resistance	Rectangular pulse Sine pulse	g/ms g/ms	8.5/5 and 4.2/10 13.4/5 and 6.5/10	
Conductor cross-sections			2)	
Electromagnetic compatibility (EMC)			3)	
Short-circuit protection				
Main circuit Fuse links gL/gG NH 3NA, DIAZED 5SB, NEOZED 5SE				
- Acc. to IEC 60947-4-1/ EN 60947-4-1	• Type of coordination "1" • Type of coordination "2" • Weld-free[4]	A A A	630 500 250	630 500 315
Auxiliary circuit				
• Fuse links gL/gG DIAZED 5SB, NEOZED 5SE (weld-free protection for $I_k \geq 1$ kA) or miniature circuit-breakers with C-characteristic (short-circuit current $I_k < 400$ A)		A	10	

1) See endurance of the main contacts on page 3/16.
2) See conductor cross-sections on page 3/49.
3) See electromagnetic compatibility (EMC) on page 3/9.
4) Test conditions according to IEC 60947-4-1.

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type Size		3RT10 75 S12	3RT10 76 S12
Control				
Operating range of the solenoid AC/DC (UC)			0.8 x $U_{s\ min}$ ... 1.1 x $U_{s\ max}$	
Power consumption of the solenoid (when coil is cool and rated range $U_{s\ min}$ ... $U_{s\ max}$)				
• Conventional operating mechanism				
- AC operation	Closing at $U_{s\ min}$	VA/p.f.	700 /0.9	
	Closing at $U_{s\ max}$	VA/p.f.	830 /0.9	
	Closed at $U_{s\ min}$	VA/p.f.	7.6 /0.9	
	Closed at $U_{s\ max}$	VA/p.f.	9.2 /0.9	
- DC operation	Closing at $U_{s\ min}$	W	770	
	Closing at $U_{s\ max}$	W	920	
	Closed at $U_{s\ min}$	W	8.5	
	Closed at $U_{s\ max}$	W	10	
• Solid-state operating mechanism				
- AC operation	Closing at $U_{s\ min}$	VA/p.f.	560 /0.8	
	Closing at $U_{s\ max}$	VA/p.f.	750 /0.8	
	Closed at $U_{s\ min}$	VA/p.f.	5.4 /0.8	
	Closed at $U_{s\ max}$	VA/p.f.	7 /0.8	
- DC operation	Closing at $U_{s\ min}$	W	600	
	Closing at $U_{s\ max}$	W	800	
	Closed at $U_{s\ min}$	W	4	
	Closed at $U_{s\ max}$	W	5	
PLC control input (EN 61131-2/type 2)			24 V DC/ ≤ 30 mA power consumption, (operating range 17 ... 30 V DC)	
Operating times (Total break-time = Opening delay + Arcing time)				
• Conventional operating mechanism				
- with 0.8 x $U_{s\ min}$ ... 1.1 x $U_{s\ max}$	Closing delay	ms	45 ... 100	
	Opening delay	ms	60 ... 100	
- for $U_{s\ min}$ ... $U_{s\ max}$	Closing delay	ms	50 ... 70	
	Opening delay	ms	70 ... 100	
• Solid-state operating mechanism, actuated via A1/A2				
- with 0.8 x $U_{s\ min}$ ... 1.1 x $U_{s\ max}$	Closing delay	ms	120 ... 150	
	Opening delay	ms	80 ... 100	
- for $U_{s\ min}$ ... $U_{s\ max}$	Closing delay	ms	125 ... 150	
	Opening delay	ms	80 ... 100	
• Solid-state operating mechanism, actuated via PLC input				
- with 0.8 x $U_{s\ min}$ ... 1.1 x $U_{s\ max}$	Closing delay	ms	60 ... 90	
	Opening delay	ms	80 ... 100	
- for $U_{s\ min}$ ... $U_{s\ max}$	Closing delay	ms	65 ... 80	
	Opening delay	ms	80 ... 100	
• Arcing time		ms	10 ... 15	

3RT10 contactors, 3-pole, 3 ... 250 kW

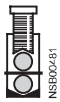
Contactor	Type / Size			3RT10 75 S12	3RT10 76 S12
Main circuit					
AC capacity					
Utilization category AC-1 Switching resistive loads					
Rated operational currents I_e	at 40 °C up to 690 V		A	430	610
	at 60 °C up to 690 V		A	400	550
	at 60 °C up to 1000 V		A	200	200
Rated output power for AC loads[1] p.f. = 0.95 (for 60 °C)	for 230 V		kW	151	208
	400 V		kW	263	362
	500 V		kW	329	452
	690 V		kW	454	624
	1000 V		kW	329	329
Minimum conductor cross-section for loads with I_e	for 40 °C		mm^2	2 x 150	2 x 185
	for 60 °C		mm^2	240	2 x 185
Utilization category AC-2 and AC-3					
Rated operational currents I_e	up to 500 V		A	400	500
	690 V		A	400	450
	1000 V		A	180	180
Rated output power for slipring or squirrel-cage motors at 50 Hz and 60 Hz	for 230 V		kW	132	164
	400 V		kW	231	291
	500 V		kW	291	363
	690 V		kW	400	453
	1000 V		kW	250	250
Thermal load capacity	10 s current[2]		A	3200	4000
Power loss per main conducting path	for I_e/AC-3/500 V		W	35	55
Utilization category AC-4 (for $I_a = 6 \times I_e$)					
Rated operational current I_e	up to 400 V		A	350	430
Rated output power for squirrel-cage motors with 50 Hz and 60 Hz	for 400 V		kW	200	250
• The following applies to an endurance of about 200 000 operating cycles:					
- Rated operational current I_e	up to 500 V		A	150	175
	690 V		A	135	150
	1000 V		A	80	80
- Rated output power for squirrel-cage motors with 50 Hz and 60 Hz	for 230 V		kW	48	56
	400 V		kW	85	98
	500 V		kW	105	123
	690 V		kW	133	148
	1000 V		kW	113	113
Utilization category AC-6a Switching AC transformers					
Rated operational current I_e					
• For inrush current n = 20	up to 690 V		A	377	404
• For inrush current n = 30	up to 690 V		A	251	270
Rated output power P					
• For inrush current n = 20	for 230 V		kVA	150	161
	400 V		kVA	261	280
	500 V		kVA	326	350
	690 V		kVA	450	483
	1000 V		kVA	311	311
• For inrush current n = 30	for 230 V		kVA	100	107
	400 V		kVA	173	187
	500 V		kVA	217	234
	690 V		kVA	300	323
	1000 V		kVA	311	311
For deviating inrush current factors x, the power must be recalculated as follows: $P_x = P_{n\,30} \cdot 30/x$					
Utilization category AC-6b Switching low-inductance (low-loss, metallized dielectric) AC capacitors Ambient temperature 40 °C					
Rated operational currents I_e	up to 500 V		A	287	407
Rated output power for single capacitors or banks of capacitors (minimum inductance of 6 µH between capacitors connected in parallel) at 50 Hz, 60 Hz and	for 230 V		kvar	114	162
	400 V		kvar	199	282
	500 V		kvar	248	352
	690 V		kvar	199	282

1) Industrial furnaces and electric heaters with resistance heating, etc. (increased power consumption on heating up taken into account).

2) According to IEC 60947-4-1. For rated values for various start-up conditions see Protection Equipment: Overload Relays.

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type / Size			3RT10 75 S12	3RT10 76 S12
Main circuit					
Load rating with DC					
Utilization category DC-1 Switching resistive load (L/R ≤ 1 ms)					
Rated operational current I_e (for 60 °C)					
• 1 current path		up to 24 V	A	400	
		60 V	A	330	
		110 V	A	33	
		220 V	A	3.8	
		440 V	A	0.9	
		600 V	A	0.6	
• 2 current paths in series		up to 24 V	A	400	
		60 V	A	400	
		110 V	A	400	
		220 V	A	400	
		440 V	A	4	
		600 V	A	2	
• 3 current paths in series		up to 24 V	A	400	
		60 V	A	400	
		110 V	A	400	
		220 V	A	400	
		440 V	A	11	
		600 V	A	5.2	
Utilization category DC-3 and DC-5 Shunt-wound and series-wound motors (L/R ≤ 15 ms)					
Rated operational current I_e (for 60 °C)					
• 1 current path		up to 24 V	A	400	
		60 V	A	11	
		110 V	A	3	
		220 V	A	0.6	
		440 V	A	0.18	
		600 V	A	0.125	
• 2 current paths in series		up to 24 V	A	400	
		60 V	A	400	
		110 V	A	400	
		220 V	A	2.5	
		440 V	A	0.65	
		600 V	A	0.37	
• 3 current paths in series		up to 24 V	A	400	
		60 V	A	400	
		110 V	A	400	
		220 V	A	400	
		440 V	A	1.4	
		600 V	A	0.75	
Operating frequency					
Operating frequency *z* in operating cycles/hour					
• Contactors without overload relays	No-load operating frequency		h^{-1}	2000	2000
Dependence of the operating frequency *z'* on the operational current *I'* and operational voltage *U'*: $z' = z \cdot (I_e/I') \cdot (400\ V/U')^{1.5} \cdot 1/h$		AC-1	h^{-1}	700	500
		AC-2	h^{-1}	200	170
		AC-3	h^{-1}	500	420
		AC-4	h^{-1}	130	130
• Contactors with overload relays (mean value)			h^{-1}	60	60

Contactor	Type Size		**3RT10 7. S12**
Conductor cross-sections			
Screw terminals	**Main conductors:** With 3RT19 66-4G box terminal		
Front clamping point connected 	• Finely stranded with end sleeve	mm^2	70 ... 240
	• Finely stranded without end sleeve	mm^2	70 ... 240
	• Stranded	mm^2	95 ... 300
	• AWG conductors, solid or stranded	AWG	3/0 ... 600 kcmil
	• Ribbon cable conductors (number x width x circumference)	mm^2	Min. 6 x 9 x 0.8, max. 20 x 24 x 0.5
Rear clamping point connected 	• Finely stranded with end sleeve	mm^2	120 ... 185
	• Finely stranded without end sleeve	mm^2	120 ... 185
	• Stranded	mm^2	120 ... 240
	• AWG conductors, solid or stranded	AWG	250 ... 500 kcmil
	• Ribbon cable conductors (number x width x circumference)	mm^2	Min. 6 x 9 x 0.8, max. 20 x 24 x 0.5
Both clamping points connected 	• Finely stranded with end sleeve	mm^2	Min. 2 x 50, max. 2 x 185
	• Finely stranded without end sleeve	mm^2	Min. 2 x 50, max. 2 x 185
	• Stranded	mm^2	Min. 2 x 70, max. 2 x 240
	• AWG conductors, solid or stranded	AWG	Min. 2 x 2/0, max. 2 x 500 kcmil
	• Ribbon cable conductors (number x width x circumference)	mm^2	Max. 2 x (20 x 24 x 0.5)
	• Terminal screws - Tightening torque	Nm	M12 (hexagon socket, A/F 5) 20 ... 22 (180 ... 195 lb.in)
Screw terminals	**Main conductors:** Without box terminal/rail connection		
	• Finely stranded with cable lug[1]	mm^2	50 ... 240
	• Stranded with cable lug[1]	mm^2	70 ... 240
	• AWG conductors, solid or stranded	AWG	2/0 ... 500 kcmil
	• Connecting bar (max. width)	mm	25
	• Terminal screws - Tightening torque	Nm	M10 x 30 (A/F 17) 14 ... 24 (124 ... 210 lb.in)
	Auxiliary conductors:		
	• Solid	mm^2	2 x (0.5 ... 1.5) 2 x (0.75 ... 2.5) acc. to IEC 60947; max. 2 x (0.75 ... 4)
	• Finely stranded with end sleeve	mm^2	2 x (0.5 ... 1.5) 2 x (0.75 ... 2.5)
	• AWG conductors, solid or stranded	AWG	2 x (18 ... 14)
	• Terminal screws - Tightening torque	Nm	M3 (PZ 2) 0.8 ... 1.2 (7 ... 10.3 lb.in)
Cage Clamp terminal	**Auxiliary conductors:**		
	• Solid	mm^2	2 x (0.25 ... 2.5)
	• Finely stranded with end sleeve	mm^2	2 x (0.25 ... 1.5)
	• Finely stranded without end sleeve	mm^2	2 x (0.25 ... 2.5)
	• AWG conductors, solid or stranded	mm^2	2 x (24 ... 14)

For tools for opening Cage Clamp terminals see Catalog LV 1, Chapter 3, Accessories and Spare Parts.
Maximum outer diameter of the conductor insulation: 3.6 mm.
With conductor cross-sections ≤ 1 mm² an "insulation stop" must be used, see Catalog LV 1, Chapter 3, Accessories and Spare Parts.

1) When connecting cable lugs to DIN 46234, the 3RT19 66-4EA1 terminal cover must be used for conductor cross-sections of 240 mm^2 and more as well as DIN 46235 for conductor cross-sections of 185 mm^2 and more to keep the phase clearance.

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type / Size			3RT10 15 S00	3RT10 16 S00	3RT10 17 S00	3RT10 23 S0	3RT10 24 S0	3RT10 25 S0	3RT10 26 S0
CSA and UL rated data										
Rated insulation voltage			V AC	600			600			
Uninterrupted current, at 40 °C	Open and enclosed		A	20			35			
Maximum horsepower ratings (CSA and UL approved values)										
Rated output power for induction motors with 60 Hz		at 200 V	hp	1.5	2	3	2	3	5	7.5
		230 V	hp	2	3	3	3	3	5	7.5
		460 V	hp	3	5	7.5	5	7.5	10	15
		575 V	hp	5	7.5	10	7.5	10	15	20
Short-circuit protection (contactor or overload relay)			kA	5	5	5	5	5	5	5
	CLASS RK5 fuse		A	60	60	60	70	70	70	100
	Circuit-breakers acc. to UL 489		A	50	50	50	70	70	70	100
NEMA/EEMAC ratings										
NEMA/EEMAC size			hp	--		0	--			1
Uninterrupted current	Open		A	--		18	--			27
	Enclosed		A	--		18	--			27
Rated output power for induction motors with 60 Hz		at 200 V	hp	--		3	--			7.5
		230 V	hp	--		3	--			7.5
		460 V	hp	--		5	--			10
		575 V	hp	--		5	--			10
Overload Relays	Type			3RU11 16			3RU11 2			
	Setting range		A	0.11 ... 12			1.8 ... 25			

Contactor	Type / Size			3RT10 34 S2	3RT10 35 S2	3RT10 36 S2	3RT10 44 S3	3RT10 45 S3	3RT10 46 S3
CSA and UL rated data									
Rated insulation voltage			V AC	600			600		
Uninterrupted current, at 40 °C	Open and enclosed		A	45	55	50	90	105	105
Maximum horsepower ratings (CSA and UL approved values)									
Rated output power for induction motors with 60 Hz		at 200 V	hp	10	10	15	20	25	30
		230 V	hp	10	15	15	25	30	30
		460 V	hp	25	30	40	50	60	75
		575 V	hp	30	40	50	60	75	100
Short-circuit protection (contactor or overload relay)			kA	5	5	5	10	10	10
	CLASS RK5 fuse		A	125	150	200	250	300	350
	Circuit-breakers acc. to UL 489		A	125	150	200	250	300	400
NEMA/EEMAC ratings									
NEMA/EEMAC size			hp	--		2	--		3
Uninterrupted current	Open		A	--		45	--		90
	Enclosed		A	--		45	--		90
Rated output power for induction motors with 60 Hz		at 200 V	hp	--		10	--		25
		230 V	hp	--		15	--		30
		460 V	hp	--		25	--		50
		575 V	hp	--		25	--		50
Overload relays	Type			3RU11 3			3RU11 4		
	Setting range		A	5.5 ... 50			18 ... 100		

Contactor	Size			**S00 Screw terminal and Cage Clamp terminal** Integrated or snap-on auxiliary switch block	**S0 to S12 Screw terminal and Cage Clamp terminal** 1 and 4-pole snap-on auxiliary switch block	**Screw terminal and Cage Clamp terminal** Laterally mountable auxiliary switch block
CSA and UL rated data for the auxiliary contacts						
Rated voltage			V AC	600	600	600
Switching capacity				A 600, Q 600	A 600, Q 600	A 300, Q 300
	Uninterrupted current at 240 V AC		A	10	10	10

3RT10 contactors, 3-pole, 3 ... 250 kW

Contactor	Type Size			3RT10 54 S6	3RT10 55 S6	3RT10 56 S6	3RT10 64 S10	3RT10 65 S10	3RT10 66 S10
CSA and UL rated data									
Rated insulation voltage			V AC	600			600		
Uninterrupted current, at 40 °C	Open and enclosed		A	140	195	195	250	330	330
Maximum horsepower ratings (CSA and UL approved values)									
Rated output power for induction motors with 60 Hz		at 200 V	hp	40	50	60	60	75	100
		230 V	hp	50	60	75	75	100	125
		460 V	hp	100	125	150	150	200	250
		575 V	hp	125	150	200	200	250	300
Short-circuit protection			kA	10	10	10	10	18	18
	CLASS RK5/L fuse		A	450	500	500	700	800	800
	Circuit-breakers acc. to UL 489		A	350	450	500	500	700	800
NEMA/EEMAC ratings									
NEMA/EEMAC size			hp	--	4	--	--	--	5
Uninterrupted current	Open		A	--	150	--	--	--	300
	Enclosed		A	--	135	--	--	--	270
Rated output power for induction motors with 60 Hz		at 200 V	hp	--	40	--	--	--	75
		230 V	hp	--	50	--	--	--	100
		460 V	hp	--	100	--	--	--	200
		575 V	hp	--	100	--	--	--	200
Overload relays	Type			3RB20 56			3RB20 66		

Contactor	Type Size			3RT10 75 S12	3RT10 76 S12
CSA and UL rated data					
Rated insulation voltage			V AC	600	
Uninterrupted current, at 40 °C	Open and enclosed		A	400	540
Maximum horsepower ratings (CSA and UL approved values)					
Rated output power for induction motors with 60 Hz		at 200 V	hp	125	150
		230 V	hp	150	200
		460 V	hp	300	400
		575 V	hp	400	500
Short-circuit protection			kA	18	30
	CLASS L fuse		A	1 000	1 200
	Circuit-breakers acc. to UL 489		A	900	900
NEMA/EEMAC ratings					
NEMA/EEMAC size			hp	--	6
Uninterrupted current	Open		A	--	600
	Enclosed		A	--	540
Rated output power for induction motors with 60 Hz		at 200 V	hp	--	150
		230 V	hp	--	200
		460 V	hp	--	400
		575 V	hp	--	400
Overload relays	Type			3RB20 66	

3RT12 vacuum contactors, 3-pole, 110 ... 250 kW

Overview

- 3RT12, vacuum contactors for switching motors

Operating mechanism types

Two types of solenoid operation are available:

- Conventional operating mechanism, version 3RT12 ..-.A
- Solid-state operating mechanism, version 3RT12 ..-.N

UC operation

The contactors can be operated with AC (40 to 60 Hz) as well as with DC.

Withdrawable coils

For simple coil replacement, e.g. if the application is replaced, the magnetic coil can be pulled out upwards after the release mechanism has been actuated and can be replaced by any other coil of the same size.

Auxiliary contact complement

The contactors can be fitted with up to 8 lateral auxiliary contacts (identical auxiliary switch blocks from S0 to S12). Of these, no more than 4 are permitted to be NC contacts.

Function

3RT12 vacuum contactors

In contrast with the 3RT10 contactors – the main contacts operate in air under atmospheric conditions – the contact gaps of the 3RT12 vacuum contactors are contained in hermetically enclosed vacuum contact tubes. Neither arcs nor arcing gases are produced. The particular benefit of 3RT12 vacuum contactors, however, is that their electrical endurance is at least twice as long as that of 3RT10 contactors. They are therefore particularly well suited to frequent switching in jogging/mixed operation, for example in crane control systems.

Advantages:

- Very long electrical endurance
- High short-time current-carrying capacity for heavy starting
- No reduction of rated operational currents up to 1000 V
- No open arcs, no arcing gases, i.e. no minimum clearances from grounded parts required either
- Longer maintenance intervals
- Increased plant availability

Notes on operation:

- Switching motors with operational voltages U_e > 500 V:
  To attenuate overvoltages and protect the motor coil insulation against reignition when switching off induction motors, it is recommended to connect the 3RT19 66-1PV surge suppression module – RC varistor – to the outgoing side (2/T1, 4/T2, 6/T3) of the contactors (accessory). This additional equipment is not required for use in circuits with converters. It could be destroyed by the voltage peaks and harmonics which are generated.
- Switching DC voltage:
  Vacuum contactors are basically unsuitable for switching DC voltage.

Contactors with conventional operating mechanism

Version 3RT1...-.A:
The solenoid is switched directly on and off with the control supply voltage U_s by way of terminals A1/A2.

Multi-voltage range for the control supply voltage U_s:
A single coil covers several control supply voltages of similar ranges which are used worldwide, e.g. 110-115-120-127 V UC or 220-230-240 V UC.

In addition, allowance is also made for a coil operating range of 0.8 times the lower ($U_{s\,min}$) and 1.1 times the upper ($U_{s\,max}$) rated control supply voltage within which the contactor switches reliably and no thermal overloading occurs.

Contactors with solid-state operating mechanism

The solenoid is supplied selectively with the power required for reliable switching and holding by upstream control electronics.

- Extended voltage range for the control supply voltage U_s:
  Compared with the conventional operating mechanism, the solid-state operating mechanism covers an even broader range of control supply voltages used worldwide within one coil variant. For example, the coil for 200 to 277 V UC ($U_{s\,min}$ to $U_{s\,max}$) covers the voltages 200-208-220-230-240-254-277 V used worldwide.
- Extended tolerance 0.7 to 1.25 × U_s:
  The wide range of the rated control supply voltage and the addiitonal coil tolerance of 0.8 × $U_{s\,min}$ to 1.1 × $U_{s\,max}$ results in an extended coil tolerance of at least 0.7 to 1.25 × U_s for the most common control supply voltages 24, 110 and 230 V for which the contactors operate reliably.
- Bridging temporary voltage dips:
  Control voltage failures dipping to 0 V (at A1/A2) are bridged for up to approx. 25 ms to avoid unintentional tripping.
- Defined ON and OFF operating points:
  For voltages of ≥ 0.8 × $U_{s\,min}$ and higher, the electronics will reliably switch the contactors on and off ≤ 0.5 × $U_{s\,min}$. The differential travel in the switching thresholds prevents the main contacts from chattering as well as increased wear or welding when operated in weak, unstable networks. This also prevents thermal overloading of the contactor coil if the voltage applied is too low (contactor does not close properly and is continuously operated with overexcitation).
- Low control power consumption when closing and in the closed state.

Electromagnetic compatibility (EMC)

The contactors with solid-state operating mechanism conform to the requirements for operation in industrial plants.

- Interference immunity
  - Burst (IEC 61000-4-4): 4 kV
  - Surge (IEC 61000-4-5): 4 kV
  - Electrostatic discharge, ESD (IEC 61000-4-2): 8/15 kV
  - Electromagnetic field (IEC 61000-4-3): 10 V/m
- Emitted interference
  - Limit value class A according to EN 55011

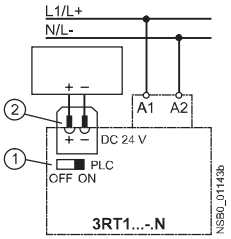
Note:
In connection with converters, the control cables must be routed separately from the load cables to the converter.

3RT1...-.N version: for 24 V DC PLC output

2 control options:

- Control without an interface directly through a 24 V DC / ≥ 30 mA PLC output (EN 61131-2). Connection by means of 2-pole plug-in connection. The screwless spring-operated connector is part of the scope of supply. The control supply voltage which supplies the solenoid operating mechanism must be connected to A1/A2.

Note:
Before start-up, the sliding-dolly switch for PLC operation must be moved to the "PLC ON" position (setting ex works: "PLC OFF").



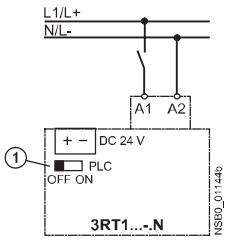
① Slide switch must be in "PLC ON" position

② Plug-in connection, 2-pole

3RT12 vacuum contactors, 3-pole, 110 ... 250 kW

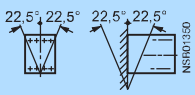
- Conventional control by applying the control supply voltage at A1/A2 through a switching contact.

Note:
The slide switch must be in the "PLC OFF" position (= setting ex works).



① Slide switch must be in "PLC OFF" position

Technical specifications

Contactor	Type Size		3RT12 64 S10	3RT12 65 S10	3RT12 66 S10
General data					
Permissible mounting position The contactors are designed for operation on a vertical mounting surface.					
Mechanical endurance		Operating cycles	10 million		
Electrical endurance			1)		
Rated insulation voltage U_i (pollution degree 3)		V	1000		
Rated impulse withstand voltage U_{imp}		kV	8		
Safe isolation Between the coil and the contacts acc. to EN 60947-1, Appendix N		V	690		
Mirror contacts A mirror contact is an auxiliary NC contact that cannot be closed simultaneously with a NO main contact.			Yes. Acc. to EN 60947-4-1, Appendix F		
Permissible ambient temperature	During operation During storage	°C °C	-25 ... +60/+55 with AS-Interface -55 ... +80		
Degree of protection acc. to EN 60947-1, Appendix C **Touch protection** acc. to EN 50274			IP00/open, coil assembly IP20 Finger-safe with cover		
Shock resistance	Rectangular pulse Sine pulse	g/ms g/ms	8.5/5 and 4.2/10 13.4/5 and 6.5/10		
Conductor cross-sections			2)		
Electromagnetic compatibility (EMC)			3)		
Short-circuit protection					
Main circuit Fuse links gL/gG NH 3NA, DIAZED 5SB, NEOZED 5SE					
- Acc. to IEC 60 947-4-1 EN 60947-4-1	• Type 1 coordination • Type 2 coordination • Weld-free[4]	A A A	500 500 400		
Auxiliary circuit					
• Fuse links gL/gG DIAZED 5SB, NEOZED 5SE (weld-free protection for $I_k \geq 1$ kA) • Or miniature circuit-breakers with C-characteristic (short-circuit current $I_k \leq 400$ A)		A	10		

1) See endurance of the main contacts on page 3/16.
2) See conductor cross-sections on page 3/56.
3) See electromagnetic compatibility (EMC) on page 3/9.
4) Test conditions according to IEC 60947-4-1.

3RT12 vacuum contactors, 3-pole, 110 ... 250 kW

Contactor	Type Size		3RT12 64 S10	3RT12 65 S10	3RT12 66 S10
Control					
Operating range of the solenoid AC/DC (UC)			0.8 x $U_{s\ min}$ ... 1.1 x $U_{s\ max}$		
Power consumption of the solenoid (when coil is cool and rated range $U_{s\ min}$ ... $U_{s\ max}$)					
• Conventional operating mechanism					
- AC operation	Closing at $U_{s\ min}$	VA/p.f.	530 /0.9		
	Closing at $U_{s\ max}$	VA/p.f.	630 /0.9		
	Closed at $U_{s\ min}$	VA/p.f.	6.1 /0.9		
	Closed at $U_{s\ max}$	VA/p.f.	7.4 /0.9		
- DC operation	Closing at $U_{s\ min}$	W	580		
	Closing at $U_{s\ max}$	W	700		
	Closed at $U_{s\ min}$	W	6.8		
	Closed at $U_{s\ max}$	W	8.2		
• Solid-state operating mechanism					
- AC operation	Closing at $U_{s\ min}$	VA/p.f.	420 /0.8		
	Closing at $U_{s\ max}$	VA/p.f.	570 /0.8		
	Closed at $U_{s\ min}$	VA/p.f.	4.3 /0.8		
	Closed at $U_{s\ max}$	VA/p.f.	5.6 /0.8		
- DC operation	Closing at $U_{s\ min}$	W	460		
	Closing at $U_{s\ max}$	W	630		
	Closed at $U_{s\ min}$	W	3.4		
	Closed at $U_{s\ max}$	W	4.2		
PLC control input (EN 61131-2/type 2)			24 V DC/ ≤ 30 mA power consumption, (operating range DC 17 ... 30 V)		
Operating times (Total break-time = Opening delay + Arcing time)					
• Conventional operating mechanism					
- with 0.8 x $U_{s\ min}$ ... 1.1 x $U_{s\ max}$	Closing delay	ms	30 ... 95		
	Opening delay	ms	40 ... 80		
- for $U_{s\ min}$ ... $U_{s\ max}$	Closing delay	ms	35 ... 50		
	Opening delay	ms	50 ... 80		
• Solid-state operating mechanism, actuated via A1/A2					
- with 0.8 x $U_{s\ min}$ ... 1.1 x $U_{s\ max}$	Closing delay	ms	105 ... 145		
	Opening delay	ms	80 ... 100		
- for $U_{s\ min}$ ... $U_{s\ max}$	Closing delay	ms	110 ... 130		
	Opening delay	ms	80 ... 100		
• Solid-state operating mechanism, actuated via PLC input					
- with 0.8 x $U_{s\ min}$ ... 1.1 x $U_{s\ max}$	Closing delay	ms	45 ... 80		
	Opening delay	ms	80 ... 100		
- for $U_{s\ min}$ ... $U_{s\ max}$	Closing delay	ms	50 ... 65		
	Opening delay	ms	80 ... 100		
• Arcing time		ms	10 ... 15		

3RT12 vacuum contactors, 3-pole, 110 ... 250 kW

Contactor	Type Size			3RT12 64 S10	3RT12 65 S10	3RT12 66 S10
Main circuit						
AC capacity						
Utilization category AC-1 **Switching resistive loads**						
Rated operational currents I_e		at 40 °C up to 1000 V	A	330		
		at 60 °C up to 1000 V	A	300		
Rated output power for AC loads[1] p.f. = 0.95 (for 60 °C)		at 230 V	kW	113		
		400 V	kW	197		
		500 V	kW	246		
		690 V	kW	340		
		1000 V	kW	492		
Minimum conductor cross-section for loads with I_e		for 40 °C	mm^2	185		
		for 60 °C	mm^2	185		
Utilization category AC-2 and AC-3						
Rated operational currents I_e		up to 1000 V	A	225	265	300
Rated output power for slipring or squirrel-cage motors at 50 Hz and 60 Hz		at 230 V	kW	73	85	97
		400 V	kW	128	151	171
		500 V	kW	160	189	215
		690 V	kW	223	265	288
		1000 V	kW	320	378	428
Thermal load capacity		10 s current[2]	A	1800	2120	2400
Power loss per conducting path		for I_e/AC-3	W	9	12	14
Utilization category AC-4 (for $I_a = 6 \times I_e$)						
Rated operational current I_e		up to 690 V	A	195	230	280
Rated output power for squirrel-cage motors with 50 Hz and 60 Hz		at 400 V	kW	110	132	160
• The following applies to an endurance of about 200 000 operating cycles:						
Rated operational currents I_e		up to 690 V	A	97	115	140
		1000 V	A	68	81	98
Rated output power for squirrel-cage motors with 50 Hz and 60 Hz		at 230 V	kW	30	37	45
		400 V	kW	55	65	79
		500 V	kW	68	81	98
		690 V	kW	94	112	138
		1000 V	kW	95	114	140
Utilization category AC-6a **Switching AC transformers**						
Rated operational current I_e						
• For inrush current n = 20		up to 690 V	A	278		
• For inrush current n = 30		up to 690 V	A	185		
Rated output power P						
• For inrush current n = 20		at 230 V	kVA	111		
		400 V	kVA	193		
		500 V	kVA	241		
		690 V	kVA	332		
		1000 V	kVA	482		
• For inrush current n = 30		at 230 V	kVA	74		
		400 V	kVA	128		
		500 V	kVA	160		
		690 V	kVA	221		
		1000 V	kVA	320		
For deviating inrush current factors x, the power must be recalculated as follows: $P_x = P_{n\,30} \cdot 30/x$						
Utilization category AC-6b **Switching low-inductance (low-loss, metallized dielectric) AC capacitors** Ambient temperature 40 °C						
Rated operational currents I_e		up to 500 V	A	220		
Rated output power for single capacitors or banks of capacitors (minimum inductance of 6 µH between capacitors connected in parallel) at 50 Hz, 60 Hz and		at 230 V	kvar	88		
		400 V	kvar	152		
		500 V	kvar	191		
		690 V	kvar	152		
Operating frequency						
Operating frequency *z* in operating cycles/hour						
Contactors without overload relays		No-load operating frequency	h^{-1}	2000	23000	
Dependence of the operating frequency z' on the operational current I' and operational voltage U': $z' = z \cdot (I_e/I') \cdot (400\ V/U')^{1.5} \cdot 1/h$		AC-1	h^{-1}	800	750	
		AC-2	h^{-1}	300	250	
		AC-3	h^{-1}	750	750	
		AC-4	h^{-1}	250	250	
Contactors with overload relays (mean value)			h^{-1}	60	60	

1) Industrial furnaces and electric heaters with resistance heating, etc. increased power consumption on heating up taken into account).

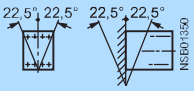
2) According to IEC 60947-4-1.
For rated values for various start-up conditions see Protection Equipment: Overload Relays.

3RT12 vacuum contactors, 3-pole, 110 ... 250 kW

Contactor	Type Size		**3RT12 6. S10**
Main conductor cross-sections			
Screw terminals	**Main conductors:** With 3RT19 66-4G box terminal		
Front clamping point connected 	• Finely stranded with end sleeve	mm^2	70 ...240
	• Finely stranded without end sleeve	mm^2	70 ...240
	• Stranded	mm^2	95 ...300
	• AWG conductors, solid or stranded	AWG	3/0 ...600 kcmil
	• Ribbon cable conductors (number x width x circumference)	mm	Min. 6 x 9 x 0.8, max. 20 x 24 x 0.5
Rear clamping point connected 	• Finely stranded with end sleeve	mm^2	120 ...185
	• Finely stranded without end sleeve	mm^2	120 ...185
	• Stranded	mm^2	120 ...240
	• AWG conductors, solid or stranded	AWG	250 ...500 kcmil
	• Ribbon cable conductors (number x width x circumference)	mm	Min. 6 x 9 x 0.8, max. 20 x 24 x 0.5
Both clamping points connected 	• Finely stranded with end sleeve	mm^2	Min. 2 x 50, max. 2 x 185
	• Finely stranded without end sleeve	mm^2	Min. 2 x 50, max. 2 x 185
	• Stranded	mm^2	Min. 2 x 70, max. 2 x 240
	• AWG conductors, solid or stranded	AWG	Min. 2 x 2/0, max. 1 x 500 kcmil
	• Ribbon cable conductors (number x width x circumference)	mm	Max. 2 x (20 x 24 x 0.5)
	• Terminal screws - Tightening torque	Nm	M12 (hexagon socket, A/F 5) 20 ... 22 (180 ... 195 lb.in)
	Main conductors: Without box terminal/rail connection		
	• Finely stranded with cable lug[1]	mm^2	50 ...240
	• Stranded with cable lug[1]	mm^2	70 ...240
	• AWG conductors, solid or stranded	AWG	2/0 ...500 kcmil
	• Connecting bar (max. width)	mm	25
	• Terminal screws - Tightening torque	Nm	M12 (hexagon socket, A/F 5) 14 ... 24 (124 ... 210 lb.in)
Screw terminals	**Auxiliary conductors:**		
	• Solid	mm^2	2 x (0.5 ... 1.5) 2 x (0.75 ... 2.5) acc. to IEC 60947; max. 2 x (0.75 ... 4)
	• Finely stranded with end sleeve	mm^2	2 x (0.5 ... 1.5) 2 x (0.75 ... 2.5)
	• AWG conductors, solid or stranded	AWG	2 x (18 ... 14)
	• Terminal screws - Tightening torque	Nm	M3 (PZ 2) 0.8 ... 1.2 (7 ... 10.3 lb.in)

1) When connecting cable lugs to DIN 46234, the 3RT19 66-4EA1 terminal cover must be used for conductor cross-sections of 240 mm^2 and more as well as DIN 46235 for conductor cross-sections of 185 mm^2 and more to keep the phase clearance.

3RT12 vacuum contactors, 3-pole, 110 ... 250 kW

Contactor	Type Size		3RT12 75 S12	3RT12 76 S12
General data				
Permissible mounting position The contactors are designed for operation on a vertical mounting surface.				
Mechanical endurance		Operating cycles	10 million	
Electrical endurance			1)	
Rated insulation voltage U_i (pollution degree 3)		V	1 000	
Rated impulse withstand voltage U_{imp}		kV	8	
Safe isolation Between the coil and the contacts acc. to EN 60947-1, Appendix N		V	690	
Mirror contacts A mirror contact is an auxiliary NC contact that cannot be closed simultaneously with a NO main contact.			Yes. Acc. to EN 60947-4-1, Appendix F	
Permissible ambient temperature	During operation During storage	°C °C	-25 ... +60/+55 with AS-Interface -55 ... +80	
Degree of protection acc. to EN 60947-1, Appendix C **Touch protection** acc. to EN 50274			IP00/open, coil assembly IP20 Finger-safe with cover	
Shock resistance	Rectangular pulse Sine pulse	g/ms g/ms	8.5/5 and 4.2/10 13.4/5 and 6.5/10	
Conductor cross-sections			2)	
Electromagnetic compatibility (EMC)			3)	
Short-circuit protection				
Main circuit Fuse links gL/gG NH 3NA, DIAZED 5SB, NEOZED 5SE				
- Acc. to IEC 60947-4-1/ EN 60947-4	• Type of coordination "1" • Type of coordination "2" • Weld-free[4]	A A A	800 800 500	
Auxiliary circuit				
• Fuse links gL/gG DIAZED 5SB, NEOZED 5SE (weld-free protection for $I_k \geq 1$ kA)		A	10	
• Or miniature circuit-breakers with C-characteristic (short-circuit current $I_k < 400$ A)				

1) See endurance of the main contacts on page 3/16.

2) See conductor cross-sections on page 3/60.

3) See electromagnetic compatibility (EMC) on page 3/9.

4) Test conditions according to IEC 60947-4-1.

3RT12 vacuum contactors, 3-pole, 110 ... 250 kW

Contactor	Type Size		3RT12 75 S12	3RT12 76 S12
Control				
Coil operating range	AC/DC (UC)		0.8 x $U_{s\,min}$ ... 1.1 x $U_{s\,max}$	
Power consumption of the solenoid (when coil is cool and rated range $U_{s\,min}$ ... $U_{s\,max}$)				
• Conventional operating mechanism				
- AC operation	Closing at $U_{s\,min}$ Closing at $U_{s\,max}$ Closed at $U_{s\,min}$ Closed at $U_{s\,max}$	VA/p.f. VA/p.f. VA/p.f. VA/p.f.	700 /0.9 830 /0.9 7.6 /0.9 9.2 /0.9	
- DC operation	Closing at $U_{s\,min}$ Closing at $U_{s\,max}$ Closed at $U_{s\,min}$ Closed at $U_{s\,max}$	W W W W	770 920 8.5 10	
• Solid-state operating mechanism				
- AC operation	Closing at $U_{s\,min}$ Closing at $U_{s\,max}$ Closed at $U_{s\,min}$ Closed at $U_{s\,max}$	VA/p.f. VA/p.f. VA/p.f. VA/p.f.	560 /0.8 750 /0.8 5.4 /0.8 7 /0.8	
- DC operation	Closing at $U_{s\,min}$ Closing at $U_{s\,max}$ Closed at $U_{s\,min}$ Closed at $U_{s\,max}$	W W W W	600 800 4 5	
PLC control input (EN 61131-2/type 2)			24 V DC/ ≤ 30 mA power consumption, (operating range 17 ... 30 V DC)	
Operating times (Total break-time = Opening delay + Arcing time)				
• Conventional operating mechanism				
- with 0.8 x $U_{s\,min}$ ... 1.1 x $U_{s\,max}$	Closing delay Opening delay	ms ms	45 ... 100 60 ... 100	
- for $U_{s\,min}$ ... $U_{s\,max}$	Closing delay Opening delay	ms ms	50 ... 70 70 ... 100	
• Solid-state operating mechanism, actuated via A1/A2				
- with 0.8 x $U_{s\,min}$ ... 1.1 x $U_{s\,max}$	Closing delay Opening delay	ms ms	120 ... 150 80 ... 100	
- for $U_{s\,min}$ ... $U_{s\,max}$	Closing delay Opening delay	ms ms	125 ... 150 80 ... 100	
• Solid-state operating mechanism, actuated via PLC input				
- with 0.8 x $U_{s\,min}$ ... 1.1 x $U_{s\,max}$	Closing delay Opening delay	ms ms	60 ... 90 80 ... 100	
- for $U_{s\,min}$ ... $U_{s\,max}$	Closing delay Opening delay	ms ms	65 ... 80 80 ... 100	
• Arcing time		ms	10 ... 15	
Main circuit				
AC capacity				
Utilization category AC-1 **Switching resistive loads**				
Rated operational currents I_e	at 40 °C up to 1000 V at 60 °C up to 1000 V	A A	610 550	
Rated output power for AC loads[1] p.f. = 0.95 (for 60 °C)	at 230 V 400 V 500 V 690 V 1000 V	kW kW kW kW kW	208 362 452 624 905	
Minimum conductor cross-section for loads with I_e	for 40 °C for 60 °C	mm^2 mm^2	2 x 185 2 x 185	
Utilization category AC-2 and AC-3				
Rated operational currents I_e	up to 1000 V	A	400	500
Rated output power for slipring or squirrel-cage motors at 50 Hz and 60 Hz	at 230 V 400 V 500 V 690 V 1000 V	kW kW kW kW kW	132 231 291 400 578	164 291 363 507 728
Thermal load capacity	10 s current[2]	A	3200	4000
Power loss per conducting path	for I_e/AC-3	W	21	32

1) Industrial furnaces and electric heaters with resistance heating, etc. increased power consumption on heating up taken into account).

2) According to IEC 60947-4-1.
For rated values for various start-up conditions see Protection Equipment: Overload Relays.

3RT12 vacuum contactors, 3-pole, 110 ... 250 kW

Contactor	Type Size			3RT12 75 S12	3RT12 76 S12
Utilization category AC-4 (for I_a = 6 x I_e)					
Rated operational current I_e		up to 690 V	A	350	430
Rated output power for squirrel-cage motors with 50 Hz and 60 Hz		at 400 V	kW	200	250
• The following applies to an endurance of about 200 000 operating cycles:					
Rated operational currents I_e		690 V 1000 V	A A	175 123	215 151
Rated output power for squirrel-cage motors with 50 Hz and 60 Hz		at 230 V 400 V 500 V 690 V 1000 V	kW kW kW kW kW	56 98 124 172 183	70 122 153 212 217
Utilization category AC-6a **Switching AC transformers**					
Rated operational current I_e					
• For inrush current n = 20 • For inrush current n = 30		up to 690 V up to 690 V	A A	419 279	
Rated output power P					
• For inrush current n = 20		at 230 V 400 V 500 V 690 V 1000 V	kVA kVA kVA kVA kVA	167 290 363 501 726	
• For inrush current n = 30		at 230 V 400 V 500 V 690 V 1000 V	kVA kVA kVA kVA kVA	111 193 241 332 482	
For deviating inrush current factors x, the power must be recalculated as follows: $P_x = P_{n\,30} \cdot 30/x$					
Utilization category AC-6b **Switching low-inductance (low-loss, metallized dielectric) AC capacitors** Ambient temperature 40 °C					
Rated operational currents I_e		up to 500 V	A	407	
Rated output power for single capacitors or banks of capacitors (minimum inductance of 6 µH between capacitors connected in parallel) at 50 Hz, 60 Hz and		at 230 V 400 V 500 V 690 V	kvar kvar kvar kvar	162 282 352 282	
Operating frequencies					
Operating frequency *z* in operating cycles/hour					
Contactors without overload relays	No-load operating frequency		h^{-1}	2000	
Dependence of the operating frequency z' on the operational current I' and operational voltage U': $z' = z \cdot (I_e/I') \cdot (400\ V/U')^{1.5} \cdot 1/h$		AC-1 AC-2 AC-3 AC-4	h^{-1} h^{-1} h^{-1} h^{-1}	700 250 750 250	
Contactors with overload relays (mean value)			h^{-1}	60	

3RT12 vacuum contactors, 3-pole, 110 ... 250 kW

Contactor	Type Size		3RT12 7. S12
Conductor cross-sections			
Screw terminals	**Main conductors:** With 3RT19 66-4G box terminal		
Front clamping point connected	• Finely stranded with end sleeve	mm²	70 ... 240
	• Finely stranded without end sleeve	mm²	70 ... 240
	• Stranded	mm²	95 ... 300
	• AWG conductors, solid or stranded	AWG	3/0 ... 600 kcmil
	• Ribbon cable conductors (number x width x circumference)	mm	Min. 6 x 9 x 0.8, max. 20 x 24 x 0.5
Rear clamping point connected	• Finely stranded with end sleeve	mm²	120 ... 185
	• Finely stranded without end sleeve	mm²	120 ... 185
	• Stranded	mm²	120 ... 240
	• AWG conductors, solid or stranded	AWG	250 ... 500 kcmil
	• Ribbon cable conductors (number x width x circumference)	mm	Min. 6 x 9 x 0.8, max. 20 x 24 x 0.5
Both clamping points connected	• Finely stranded with end sleeve	mm²	Min. 2 x 50, max. 2 x 185
	• Finely stranded without end sleeve	mm²	Min. 2 x 50, max. 2 x 185
	• Stranded	mm²	Min. 2 x 70, max. 2 x 240
	• AWG conductors, solid or stranded	AWG	Min. 2 x 2/0, max. 2 x 500 kcmil
	• Ribbon cable conductors (number x width x circumference)	mm	Max. 2 x (20 x 24 x 0.5)
	• Terminal screws - Tightening torque	Nm	M12 (hexagon socket, A/F 5) 20 ... 22 (180 ... 195 lb.in)
	Main conductors: Without box terminal/rail connection		
	• Finely stranded with cable lug[1]	mm²	50 ... 240
	• Stranded with cable lug[1]	mm²	70 ... 240
	• AWG conductors, solid or stranded	AWG	2/0 ... 500 kcmil
	• Connecting bar (max. width)	mm	25
	• Terminal screws - Tightening torque	Nm	M10 x 30 (hexagon socket, A/F 17) 14 ... 24 (124 ... 240 lb.in)
Screw terminals	**Auxiliary conductors:**		
	• Solid	mm²	2 x (0.5 ... 1.5) 2 x (0.75 ... 2.5) acc. to IEC 60947; Max. 2 x (0.75 ... 4)
	• Finely stranded with end sleeve	mm²	2 x (0.5 ... 1.5) 2 x (0.75 ... 2.5)
	• AWG conductors, solid or stranded	AWG	2 x (18 ... 14)
	• Terminal screws - Tightening torque	Nm	M3 (PZ 2) 0.8 ... 1.2 (7 ... 10.3 lb.in)

1) When connecting cable lugs to DIN 46234, the 3RT19 66-4EA1 terminal cover must be used for conductor cross-sections of 240 mm² and more as well as DIN 46235 for conductor cross-sections of 185 mm² and more to keep the phase clearance.

Contactor	Type Size			3RT12 64 S10	3RT12 65 S10	3RT12 66 S10	3RT12 75 S12	3RT12 76 S12
CSA and UL rated data								
Rated insulation voltage			V AC	600			600	
Uninterrupted current, at 40 °C	Open and enclosed		A	330			540	
Maximum horsepower ratings (CSA and UL approved values)								
Rated output power for induction motors with 60 Hz		at 200 V	hp	60	75	100	125	150
		230 V	hp	75	100	125	150	200
		460 V	hp	150	200	250	300	400
		575 V	hp	200	250	300	400	500
Short-circuit protection			kA	10	18	18	18	30
	CLASS L fuse		A	700	800	800	1200	1200
	Circuit-breakers acc. to UL 489		A	500	700	900	1000	1200
NEMA/EEMAC ratings	NEMA/EEMAC size		hp	--	--	5	--	6
Uninterrupted current	Open		A	--	--	300	--	600
	Enclosed		A	--	--	270	--	540
Rated output power for induction motors with 60 Hz		at 200 V	hp	--	--	75	--	150
		230 V	hp	--	--	100	--	200
		460 V	hp	--	--	200	--	400
		575 V	hp	--	--	200	--	400
Overload relays	Type			3RB20 66			3RB20 66	

Overview

IEC 60947-4-1, EN 60947-4-1 (VDE 0660 Part 102)

The 3TF68/69 contactors are climate-proof. They are finger-safe according to EN 50274. Depending on the arrangement in relation to other devices, the connecting bars may have to be fitted with terminal covers (see Accessories and Spare Parts).

Function

Main contacts

Contact erosion indication with 3TF68/69 vacuum contactors

The contact erosion of the vacuum interrupters can be checked during operation with the help of 3 white double slides on the contactor base. If the distance indicated by one of the double slides is < 0.5 mm while the contactor is in the closed position, the vacuum interrupter must be replaced. To ensure maximum reliability, it is recommended to replace all 3 vacuum interrupters.

Auxiliary contacts

Contact reliability

The auxiliary contacts are suitable for solid-state circuits

- With currents ≥ 1 mA
- And voltages from 17 V.

Overvoltage damping

Control circuit

Protection of coils against overvoltages:

AC operation

- Fitted with varistors as standard

DC operation

Retrofitting options:

- With varistors

If 3TF68/3TF69 is to be used for DC operation, an additional reversing contactor is required; this is automatically included in the delivery in the same packaging as the contactor.

Electromagnetic compatibility

3TF68/69..-.**C** contactors for AC operation are fitted with an electronically controlled solenoid operating mechanism with a high immunity against interference.

Contactor type	Rated control supply voltage U_s	Overvoltage type (IEC 60801)	Degree of severity (IEC 60801)	Overvoltage strength
3TF68 44-.C.., 3TF69 44-.C..	110 V ... 132 V	Burst Surge	3 4	2 kV 6 kV
	200 V ... 277 V	Burst Surge	4 4	4 kV 5 kV
	380 V ... 600 V	Burst Surge	4 4	4 kV 6 kV

Note:
*During operation in installations in which the emitted interference limits cannot be observed, e.g. when used for output contactors in converters, 3TF68/69..-.**Q** contactors without a main conductor path circuit are recommended (see description below).*

Application

The standard 3TF68..-.C and 3TF69..-.C contactors with electronically controlled contactor mechanism, have high resistance to electromagnetic interference.
The 3TF68..-.Q and 3TF69..-.Q contactors have been designed for use in installations in which the AC control supply voltage is subject to very high levels of interference.

Causes for such interference can be, for example:

- Frequency converters which are operated nearby can cause periodic overvoltages at the control level of the contactors.
- High-energy pulses cause by switching operations and atmospheric discharges can cause interference on the control wires.

To reduce interference voltages caused by frequency converters, the manufacturer recommends the use of e.g. input filters, output filters, grounding or screening in the installation.

Further measures that should be applied for overvoltage damping:

- Feeding the contactors using control-power transformer according to EN 60204 – rather than directly from the mains
- Use of overvoltage arresters, if required

For operating conditions where there are high interference voltages and no measures that reduce interference voltage coupling to the control voltage level have been taken, use of contactors 3TF68..-.Q and 3TF69..-.Q is highly recommended.

Version

The magnetic systems of the 3TF68..-.Q and 3TF69..-.Q contactors for AC operation are equipped with rectifiers for DC economy connection.

A 3TC44 reversing contactor with a mounted series resistor is used to switch to the holding excitation.

The reversing contactor can be fitted separately. The reversing contactors is connected to the 3TF6 main conductor by means of a one-meter connection lead with plug-in connectors.

Connection

Control circuit

The rectifier bridge is connected to varistors for protection against overvoltages. The built-in rectifier bridge affords sufficient protection for the coils.

Main circuit

As standard 3TF6 contactors with integrated RC varistors.

Protection of the main conducting paths

An integrated RC varistor circuit for the main conducting paths of the contactors dampens the switching overvoltage rises to safe values. This prevents multiple restriking.

The operator of an installation can therefore rest assured that the motor winding cannot be damaged by switching overvoltages with steep voltage rises.

Important note: The overvoltage damping circuit is not required if 3TF68/69 contactors are used in circuits with DC choppers, frequency converters or speed-variable drives, for example. It could be damaged by the voltage peaks and harmonics which are generated. This may cause phase-to-phase short-circuits in the contactors.

*Solution: Order special contactor version without overvoltage damping. The Order No. must include "**-Z**" and the order code "**A02**". Without additional charge.*

Important note:
The overvoltage damping circuit is not required if 3TF68/69 contactors are used in circuits with DC choppers, frequency converters or speed-variable drives, for example. It could be damaged by the voltage peaks and harmonics which are generated. This may cause phase-to-phase short-circuits in the contactors.

3TF6 vacuum contactors, 3-pole, 335 ... 450 kW

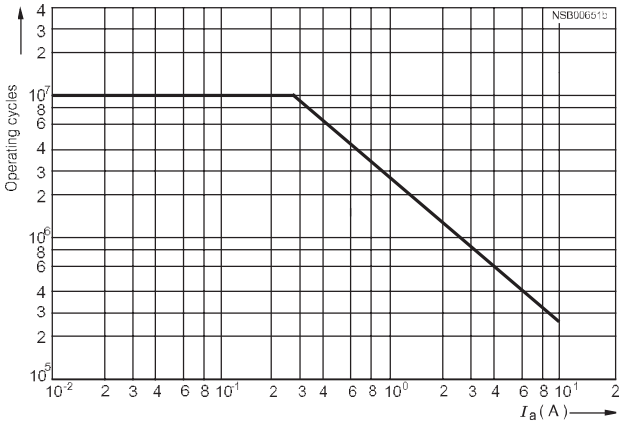
Technical specifications

Contactor Type			3TF68 and 3TF69
Rated data of the auxiliary contacts			Acc. to IEC 60947-5-1/DIN VDE 0660 Part 200
Rated insulation voltage U_i (pollution degree 3)		V	690
Continuous thermal current I_{th} = Rated operational current I_e/AC-12		A	10
AC load **Rated operational current I_e/AC-15/AC-14** For rated operational voltage U_e			
	24 V	A	10
	110 V	A	10
	125 V	A	10
	220 V	A	6
	230 V	A	5.6
	380 V	A	4
	400 V	A	3.6
	500 V	A	2.5
	660 V	A	2.5
	690 V	A	2.3
DC load **Rated operational current I_e/DC-12** For rated operational voltage U_e			
	24 V	A	10
	60 V	A	10
	110 V	A	3.2
	125 V	A	2.5
	220 V	A	0.9
	440 V	A	0.33
	600 V	A	0.22
Rated operational current I_e/DC-13 For rated operational voltage U_e			
	24 V	A	10
	60 V	A	5
	110 V	A	1.14
	125 V	A	0.98
	220 V	A	0.48
	440 V	A	0.13
	600 V	A	0.07
CSA and UL rated data for the auxiliary contacts			
Rated voltage		AC V, max.	600
Switching capacity			A 600, P 600

Endurance of the auxiliary contacts

The contact endurance for utilization category AC-12 or AC-15/AC-14 depends mainly on the breaking current. It is assumed that the operating mechanisms are switched randomly, i.e. not synchronized with the phase angle of the supply system.

3TF68 and 3TF69 contactors at 230 V AC

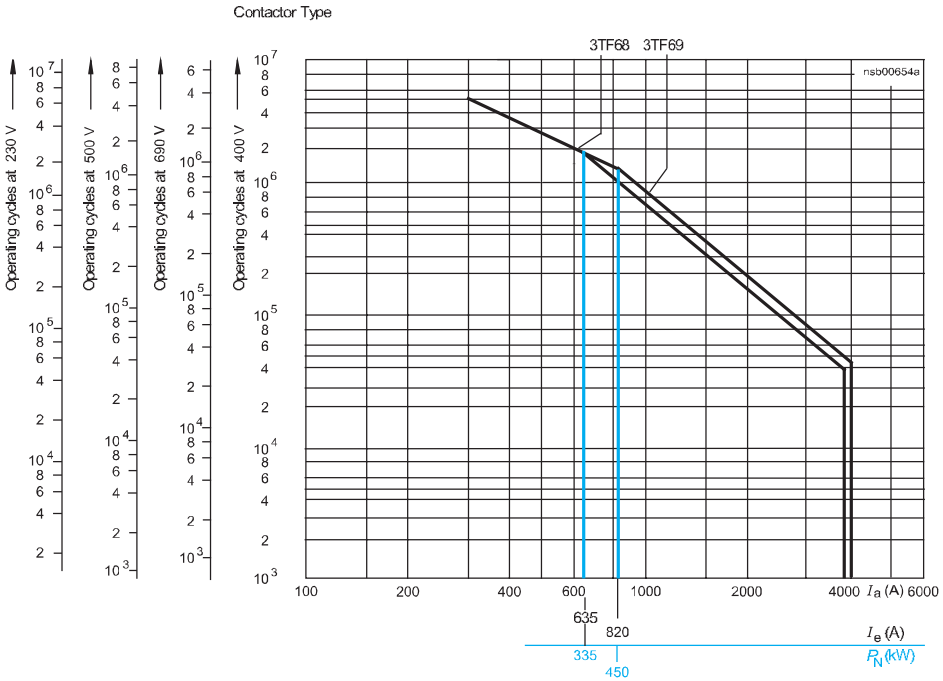


Contact erosion indication with 3TF68 and 3TF69 vacuum contactors

The contact erosion of the vacuum interrupters can be checked during operation with the help of 3 white double slides on the contactor base.

If the distance indicated by one of the double slides is < 0.5 mm while the contactor is in the closed position, the vacuum interrupter must be replaced. To ensure maximum reliability, it is recommended to replace all 3 vacuum interrupters.

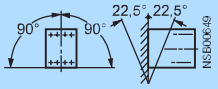
Endurance of the main contacts



3TF68 and 3TF69 contactors

Legend for the diagrams:
P_N = Rated output power for squirrel-cage motors at 400 V
I_a = Breaking current
I_e = Rated operational current

3TF6 vacuum contactors, 3-pole, 335 ... 450 kW

Contactor	Type Size		3TF68 14	3TF69 14
General data				
Permissible mounting position[1)2)] The contactors are designed for operation on a vertical mounting surface.	AC operation and DC operation			
Mechanical endurance		Operating cycles	5 million	
Electrical endurance		Operating cycles	[3)]	
Rated insulation voltage U_i (pollution degree 3)		kV	1	
Rated impulse withstand voltage U_{imp}		kV	8	
Safe isolation Between the coil and the contacts acc. to EN 60947-1, Appendix N		kV	1	
Mirror contacts A mirror contact is an auxiliary NC contact that cannot be closed simultaneously with a NO main contact. One NC contact each must be connected in series for the right and left auxiliary switch block respectively.			Yes. Acc. to EN 60947-4-1, Appendix F	
Permissible ambient temperature	During operation During storage	°C °C	-25 ... +55 -55 ... +80	
Degree of protection acc. to EN 60947-1, Appendix C **Touch protection** acc. to EN 50274			IP00/open, coil assembly IP40 Finger-safe with cover	
Shock resistance				
• Rectangular pulse	AC operation DC operation	g/ms g/ms	8.1/5 and 4.7/10 9/5 and 5.7/10	9.5/5 and 5.7/10 8.6/5 and 5.1/10
• Sine pulse	AC operation DC operation	g/ms g/ms	12.8/5 and 7.4/10 14.4/5 and 9.1/10	13.5/5 and 7.8/10 13.5/5 and 7.8/10
Conductor cross-sections			See Conductor Cross-Sections	
Electromagnetic compatibility (EMC)			See Electromagnetic compatibility (EMC)	
Short-circuit protection				
Main circuit Fuse links gL/gG NH 3NA, DIAZED 5SB, NEOZED 5SE				
- Acc. to IEC 60947-4-1/ EN 60947-4-1	• Type of coordination "1" • Type of coordination "2" • Weld-free[4)]	A A A	1000 500 400	1250 630 500
Auxiliary circuit				
• Fuse links gL/gG NH 3NA, DIAZED 5SB, NEOZED 5SE (weld-free protection at $I_k \geq 1$kA)		A	10	
• Or miniature circuit-breakers with C-characteristic ($I_k < 400$ A)		A	10	

1) To easily replace the laterally mounted auxiliary contacts it is recommended to maintain a minimum distance of 30 mm between the contactors.

2) If mounted at a 90° angle (current paths are horizontally above each other), the operating frequency is reduced by 80% compared with the normal values.

3) See endurance of the auxiliary contacts.

4) Test conditions according to IEC 60947-4-1.

3TF6 vacuum contactors, 3-pole, 335 ... 450 kW

Contactor Type Size			3TF68 14	3TF69 14
Control				
Coil operating range			0.8 x $U_{s\,min}$ ... 1.1 x $U_{s\,max}$	
Power consumption of the magnetic coils (when coil is cold and 1.0 x U_s)				
• AC operation, $U_{s\,max}$	- Closing - Closed	VA/p.f. VA/p.f.	1 850 /1 49 /0.15	950 /0.98 30.6 /0.31
• AC operation, $U_{s\,min}$	- Closing - Closed	VA/p.f. VA/p.f.	1 200 /1 13.5 /0.47	600 /0.98 12.9 /0.43
• DC economy circuit[1]	- Closing at 24 V - Closed	W W	1.010 28	960 20.6
For contactors of type 3TF68/69..- **Q** :				
• AC operation, $U_{s\,min}$[2]	- Closing - Closed	VA/p.f. VA/p.f.	1000/0.99 11/1	1150/0.99 11/1
Operating times at 0.8 ... 1.1 x U_s (Total break time = Opening delay + Arcing time)			(Values apply to cold and warm coil)	
• AC operation	- Closing delay - Opening delay	ms ms	70 ... 120 (22 ... 65)[3] 70 ... 100	80 ... 120 70 ... 80
• DC economy circuit	- Closing delay - Opening delay	ms ms	76 ... 110 50	86 ... 280 19 ... 25
• Arcing time		ms	10 ... 15	10
For contactors of type 3TF68/69..- **Q** :				
• AC operation	- Closing delay - Opening delay	ms ms	35 ... 90 65 ... 90	45 ... 160 30 ... 80
Operating times at 1.0 x U_s (Total break time = Opening delay + Arcing time)				
• AC operation	- Closing delay - Opening delay	ms ms	80 ... 100 (30 ... 45)[3] 70 ... 100	85 ... 100 70
• DC economy circuit	- Closing delay - Opening delay	ms ms	80 ... 90 50	90 ... 125 19 ... 25
Minimum command duration For closing	Standard Reduced make time	ms ms	120 90	120 --
Minimum interval time between two ON commands		ms	100	300

1) At 24 V DC; for further voltages, deviations of up to ±10 % are possible.

2) Including reversing contactor.

3) Values in brackets apply to contactors with reduced operating times.

3TF6 vacuum contactors, 3-pole, 335 ... 450 kW

Contactor	Type Size			3TF68 14	3TF69 14
Main circuit					
AC capacity					
Utilization category AC-1 **Switching resistive loads**					
Rated operational currents I_e	for 40 °C up to 690 V		A	700	910
	for 55 °C up to 690 V		A	630	850
	for 55 °C up to 1000 V		A	450	800
Rated output power for AC loads with p.f. = 0.95 for 55 °C		230 V	kW	240	323
		400 V	kW	415	558
		500 V	kW	545	735
		690 V	kW	720	970
		1000 V	kW	780	1 385
Minimum conductor cross-sections for loads with I_e		for 40°C	mm^2	2 x 240	$I_e \geq 800$ A: 2 x 260 x 5
		for 55°C	mm^2	2 x 185	$I_e < 800$ A: 2 x 240
Utilization category AC-2 and AC-3					
Rated operational currents I_e		up to 690 V	A	630	820
		1000 V	A	435	580
Rated output power for slipring or squirrel-cage motors at 50 Hz and 60 Hz		at 230 V	kW	200	260
		400 V	kW	347	450
		500 V	kW	434	600
		690 V	kW	600	800
		1000 V	kW	600	800
Utilization category AC-4 (for $I_a = 6 \times I_e$)					
Rated operational current I_e		up to 690 V	A	610	690
Rated output power for squirrel-cage motors with 50 Hz and 60 Hz		at 400 V	kW	355	400
• The following applies to an endurance of about 200 000 operating cycles:					
Rated operational currents I_e		up to 690 V	A	300	360
		1000 V	A	210	250
Rated output power for squirrel-cage motors with 50 Hz and 60 Hz		at 230 V	kW	97	110
		400 V	kW	168	191
		500 V[1]	kW	210	250
		690 V[1]	kW	278	335
		1000 V[1]	A	290	350
Utilization category AC-6a **Switching AC transformers**					
Rated operational currents I_e		up to 400 V			
• For inrush current n = 20			A	513	675
• For inrush current n = 30			A	342	450
Rated output power P					
For inrush current n = 20		230 V	kVA	195	256
		400 V	kVA	338	445
		500 V	kVA	444	584
		690 V	kVA	586	771
		1000 V	kVA	752	1003
For inrush current n = 30[2]		230 V	kVA	130	171
		400 V	kVA	226	297
		500 V	kVA	296	389
		690 V	kVA	390	514
		1000 V	kVA	592	778
Utilization category AC-6b **Switching low-inductance (low-loss, metallized dielectric) AC capacitors**					
Rated operational currents I_e		up to 400 V	A	433	
Rated output power for single capacitors at 50 Hz and 60 Hz		at 230 V	kvar	175	
		400 V	kvar	300	
		500 V	kvar	400	
		690 V	kvar	300	
Rated output power for banks of capacitors (minimum inductance is 6 µH between capacitors connected in parallel) at 50 Hz and 60 Hz		at 230 V	kvar	145	
		400 V	kvar	250	
		500 V	kvar	333	
		690 V	kvar	250	

1) Max. permissible rated operational current I_e/AC-4 = I_e/AC-3 up to 500 V, for reduced contact endurance and reduced operating frequency.

2) For deviating inrush current factors x, the power must be recalculated as follows: $P_x = P_{n30} \cdot 30/x$.

3TF6 vacuum contactors, 3-pole, 335 ... 450 kW

Contactor	Type Size			3TF68 14	3TF69 14
Main circuit					
AC capacity					
Short-time current carrying capacity (5 ... 30 s)					
• CLASS 5 and 10			A	630	820
• CLASS 15			A	630	662
• CLASS 20			A	536	572
• CLASS 25			A	479	531
• CLASS 30			A	441	500
Thermal current-carrying capacity 10 s current[1]			A	5040	7000
Power loss per conducting path at I_e/AC-3 /690 V			W	45	70
Operating frequency					
Operating frequency z in operating cycles/hour					
• Contactors without overload relays	No-load operating frequency AC		1/h	2000	1000
	No-load operating frequency DC		1/h	1000	1000
		AC-1	1/h	700	700
		AC-2	1/h	200	200
		AC-3	1/h	500	500
		AC-4	1/h	150	150
• Contactors with overload relays (mean value)			1/h	15	15
Conductor cross-sections					
• Screw terminals	**Main conductors:**				
	• Busbar connections				
	- Finely stranded with cable lug		mm^2	50 ... 240	50 ... 240
	- Stranded with cable lug		mm^2	70 ... 240	50 ... 240
	- Solid or stranded		AWG	2/0 ... 500 MCM	2/0 ... 500 MCM
	- Connecting bar (max. width)		mm	50	60 ($U_e \leq$ 690 V) 50 (U_e > 690 V)
	• Terminal screw			M10 x 30	M12 x 40
	- Tightening torque		Nm	14 ... 24 (124 ... 210 lb.in)	20 ... 35 (177 ... 310 lb.in)
	• With box terminal[2]				
	- Connectable copper bars				
	- Width		mm	15 ... 25	15 ... 38
	- Max. circumference		mm	1 x 26 or 2 x 11	1 x 46 or 2 x 18
	- Terminal screw			A/F 6 (hexagon socket)	A/F 8 (hexagon socket)
	- Tightening torque		Nm	25 ... 40 (221 ... 354 lb.in)	35 ... 50 (266 ... 443 lb.in)
	Auxiliary conductors:				
	• Solid		mm^2	2 x (0.5 ... 1) / 2 x (1 ... 2.5)	
	• Finely stranded with end sleeve		mm^2	2 x (0.5 ... 1) / 2 x (0.75 ... 2.5)	
	• Pin terminal to DIN 46231		mm^2	2 x (1 ... 1.5)	
	• Solid or stranded		AWG	2 x (18 ... 12)	
	• Tightening torque		Nm	0.8 ... 1.4 (7 ... 12 lb.in)	
CSA and UL rated data					
Rated insulation voltage			V AC	600	600
Uninterrupted current	Open and enclosed		A	630	820
Maximum horsepower ratings (CSA and UL approved values)					
Rated output power for induction motors with 60 Hz		at 200 V	hp	231	290
		230 V	hp	266	350
		460 V	hp	530	700
		575 V	hp	664	860
NEMA/EEMAC ratings					
SIZE			hp	6	7
Uninterrupted current	Open		A	600	820
	Enclosed		A	540	810
Rated output power for induction motors with 60 Hz		at 200 V	hp	150	--
		230 V	hp	200	300
		460 V	hp	400	600
		575 V	hp	400	600
Overload relays	Type			3RB12 .	
	Setting range		A	200 ... 820	

For short-circuit protection with overload relays see Protection Equipment: Overload Relays

1) According to IEC 60947-4-1.

2) See Accessories and Spare Parts.

3TB5 contactors with DC solenoid system, 3-pole, 55 ... 200 kW

Overview

3TB5 contactors with DC solenoid system, 3-pole, 55 ... 200 kW

DIN VDE 0660

The contactors are climate-proof and finger-safe according to EN 50274.

Technical specifications

Contactor Type			3TB50	3TB52 to 3TB56
Rated data of the auxiliary contacts			Acc. to IEC 60947-5-1/DIN VDE 0660 Part 200	
Rated insulation voltage U_i (pollution degree 3)		V	690	
Continuous thermal current I_{th} =Rated operational current I_e/AC-12		A	10	
AC load				
Rated operational current I_e/AC-15/AC-14				
For rated operational voltage U_e				
	24 V	A	10	
	110 V	A	10	
	125 V	A	10	
	220 V	A	6	
	230 V	A	5.6	
	380 V	A	4	
	400 V	A	3.6	
	500 V	A	2.5	
	660 V	A	2.5	
	690 V	A	--	
DC load				
Rated operational current I_e/DC-12				
For rated operational voltage U_e				
	24 V	A	10	10
	60 V	A	10	10
	110 V	A	3.2	8
	125 V	A	2.5	6
	220 V	A	0.9	2
	440 V	A	0.33	0.6
	600 V	A	0.22	0.4
Rated operational current I_e/DC-13[1]				
For rated operational voltage U_e				
	24 V	A	10 (10)	10 (10)
	60 V	A	5 (7)	5 (4)
	110 V	A	1.14 (3.2)	2.4 (1.8)
	125 V	A	0.98 (2.5)	2.1 (1.6)
	220 V	A	0.48 (0.9)	1.1 (0.9)
	440 V	A	0.13 (0.33)	0.32 (0.27)
	600 V	A	0.075 (0.22)	0.21 (0.18)

Contactor Type			3TB50 3 to 3TB56
CSA and UL rated data for the auxiliary contacts			
Rated voltage		AC V, max.	600
Switching capacity			A 600, P 600

1) Values in brackets apply to auxiliary contacts with delayed NC contact.

Endurance of the main contacts

The characteristic curves show the contact endurance of the contactors when switching resistive and inductive AC loads (AC-1/AC-3) depending on the breaking current and rated operational voltage. It is assumed that the operating mechanisms are switched randomly, i.e. not synchronized with the phase angle of the supply system.

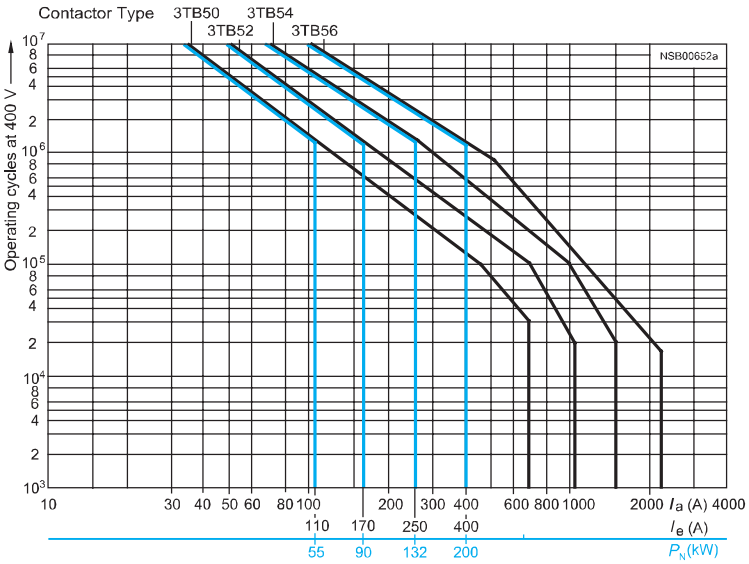
The rated operational current I_e complies with utilization category AC-4 (breaking six times the rated operational current) and is intended for a contact endurance of approx. 200 000 operating cycles.

If a shorter endurance is sufficient, the rated operational current I_e/AC-4 can be increased.

If the contacts are used for mixed operation, i.e. if normal switching (breaking the rated operational current according to utilization category AC-3) in combination with intermittent inching (breaking several times the rated operational current according to utilization category AC-4), the contact endurance can be calculated approximately from the following equation:

$$X = \frac{A}{1 + \frac{C}{100}\left(\frac{A}{B} - 1\right)}$$

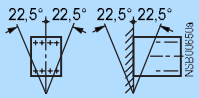
Characters in the equation:
X Contact endurance for mixed operation in operating cycles
A Contact endurance for normal operation ($I_a = I_e$) in operating cycles
B Contact endurance for inching (I_a = multiple of I_e) in operating cycles
C Inching operations as a percentage of total switching operations



3TB50 to 3TB56 contactors

Legend for the diagrams:
P_N = Rated output power for squirrel-cage motors at 400 V
I_a = Breaking current
I_e = Rated operational current

3TB5 contactors with DC solenoid system, 3-pole, 55 ... 200 kW

Contactor	Type / Size		3TB50 6	3TB52 8	3TB54 10	3TB56 12
General data						
Permissible mounting position, assembly note[1] The contactors are designed for operation on a vertical mounting surface.						
Mechanical endurance		Operating cycles	10 million			
Electrical endurance			[2]			
Rated insulation voltage U_i		V	1000			
Safe isolation Between the coil and the contacts acc. to EN 60947-1, Appendix N		V	690			
Mirror contacts A mirror contact is an auxiliary NC contact that cannot be closed simultaneously with a NO main contact.			Yes. Acc. to EN 60947-4-1, Appendix F			
Permissible ambient temperature	During operation During storage	°C °C	-25 ... +55 -50 ... +80			
Degree of protection acc. to EN 60947-1, Appendix C **Touch protection** acc. to EN 50274			IP00 (open), coil assembly IP40 Finger-safe with cover			
Shock resistance (rectangular pulse)		g/ms	5/10	5.9/10	5.9/10	5.9/10
Short-circuit protection						
Main circuit						
Fuse links gL/gG	Type of coordination "1"	A	250	315	400	630
NH 3NA, DIAZED 5SB	Type of coordination "2"	A	224	250	315	500
Auxiliary circuit short-circuit current $I_k \geq 1$ kA						
• Fuse links gL/gG, DIAZED 5SB, NEOZED 5SE		A	16			
• Miniature circuit-breaker with C-characteristic		A	10			
Control						
Coil operating range			0.8 ... 1.1 x U_s			
Power consumption of the coil (for cold coil and 1.0 x U_s) Closing = Closed		W	25	30	60	86
Operating times at 0.8 ... 1.1 x U_s Total break time = Opening delay + Arcing time			(the values apply up to and including 20 % undervoltage, 10 % overvoltage, as well as when the coil is cold and warm)			
• Closing delay		ms	105 ... 360	115 ... 400	105 ... 400	110 ... 400
• Opening delay[3]		ms	18 ... 30	22 ... 35	24 ... 55	40 ... 110
• Arcing time		ms	10 ... 15	10 ... 15	10 ... 15	10 ... 15
Operating times at 1.0 x U_s						
• Closing delay		ms	120 ... 230	130 ... 250	115 ... 250	120 ... 250
• Opening delay[3]		ms	20 ... 26	24 ... 32	35 ... 50	60 ... 95
Main circuit						
AC capacity						
Utilization category AC-1, switching resistive loads						
Rated operational current I_e	for 40 °C up to 690 V for 55 °C up to 690 V	A A	170 160	230 200	325 300	425 400
Rated output power for AC loads[4] p.f. = 0.95 (for 55 °C)	230 V 400 V 500 V 690 V	kW kW kW kW	61 105 138 183	76 132 173 228	114 195 260 340	152 262 345 455
Minimum conductor cross-sections for loads with I_e		mm^2	70	95	185	240
Utilization category AC-2 and AC-3			[5]			
Utilization category AC-4 (for $I_a = 6 \times I_e$)						
• The following applies to an endurance of about 200 000 operating cycles:						
Rated operational current I_e		A	52	72	103	120
Rated output power for squirrel-cage motors with 50 Hz and 60 Hz	230 V 400 V 500 V 690 V	kW kW kW kW	15.6 27 35 45	21 37 48 64	31 55 72 92	37.5 65 85.5 106
Max. rated operational current I_e /AC-4	for 400 V	A	110	170	250	400

1) For reversing duty, deviations from the vertical axis are not permitted.

2) See endurance of the main contacts.

3) The opening delay times can increase if the contactor coils are damped against voltage peaks.

4) Industrial furnaces and electric heaters with resistance heating, etc. (increased power consumption on heating up has been taken into account).

5) See selection table in Catalog LV 1.

3TB5 contactors with DC solenoid system, 3-pole, 55 ... 200 kW

Contactor Type Size			3TB50 6	3TB52 8	3TB54 10	3TB56 12
Main circuit						
AC capacity						
Switching low-inductance (low-loss, metallized dielectric) AC capacitors [1]						
Rated operational current I_e at 400 V		A	87	144	217	289
Rated output power for single capacitors at 50 Hz	230 V	kvar	35	58	87	115
	400 V	kvar	60	100	150	200
	500 V	kvar	80	130	190	265
	690 V	kvar	60	100	150	200
Rated output power for banks of capacitors (minimum inductance is 6 µH between capacitors connected in parallel) at 50 Hz	230 V	kvar	30	40	66	85
	400 V	kvar	50	70	115	150
	500 V	kvar	66	90	145	195
	690 V	kvar	50	70	115	150
Load rating with DC						
Utilization category DC-1 **Switching resistive loads** (L/R ≤ 1 ms)						
Rated operational current I_e (for 55 °C)						
• 1 current path	24 V	A	160	200	300	400
	60 V	A	80	80	300	330
	110 V	A	18	18	33	33
	220 V	A	3.4	3.4	3.8	3.8
	440 V	A	0.8	0.8	0.9	0.9
	600 V	A	0.5	0.5	0.6	0.6
• 2 current paths in series	24 V	A	160	200	300	400
	60 V	A	160	200	300	400
	110 V	A	160	200	300	400
	220 V	A	20	20	300	400
	440 V	A	3.2	3.2	4	4
	600 V	A	1.6	1.6	2	2
• 3 current paths in series	24 V	A	160	200	300	400
	60 V	A	160	200	300	400
	110 V	A	160	200	300	400
	220 V	A	160	200	300	400
	440 V	A	11.5	11.5	11	11
	600 V	A	4	4	5.2	5.2
Utilization category DC-3/DC-5 **Shunt-wound and series-wound motors** (L/R ≤ 15 ms)						
Rated operational current I_e (for 55 °C)						
• 1 current path	24 V	A	16	16	35	35
	60 V	A	7.5	7.5	11	11
	110 V	A	2.5	2.5	3	3
	220 V	A	0.6	0.6	0.6	0.6
	440 V	A	0.17	0.17	0.18	0.18
	600 V	A	0.12	0.12	0.125	0.125
• 2 current paths in series	24 V	A	160	200	300	400
	60 V	A	160	200	300	400
	110 V	A	160	200	300	400
	220 V	A	2.5	2.5	2.5	2.5
	440 V	A	0.65	0.65	0.65	0.65
	600 V	A	0.37	0.37	0.37	0.37
• 3 current paths in series	24 V	A	160	200	300	400
	60 V	A	160	200	300	400
	110 V	A	160	200	300	400
	220 V	A	160	200	300	400
	440 V	A	1.4	1.4	1.4	1.4
	600 V	A	0.75	0.75	0.75	0.75
Operating frequency						
Operating frequency *z* in operating cycles/hour						
• Contactors without overload relays	AC-1	h^{-1}	1 000			
	AC-2	h^{-1}	500			
	AC-3	h^{-1}	500			
	AC-4	h^{-1}	250			
• Contactors with overload relays (mean value)		h^{-1}	15			

1) Contact endurance 0.1 million operating cycles.

3TB5 contactors with DC solenoid system, 3-pole, 55 ... 200 kW

Contactor	Type Size			3TB50 6	3TB52 8	3TB54 10	3TB56 12
Conductor cross-sections							
Screw terminals	**Main conductors:**						
	• Finely stranded with cable lug		mm^2	16 ... 70	35 ... 95	50 ... 240	50 ... 240
	• Stranded with cable lug		mm^2	25 ... 70	50 ... 120	70 ... 240	70 ... 240
	• Busbars		mm	15 x 3	20 x 3	25 x 5	2 x (25 x 3)
	• Terminal screw			M6	M8	M10	M10
	Auxiliary conductors:						
	• Solid		mm^2	1 ... 2.5			
	• Finely stranded with end sleeve		mm^2	0.75 ... 1.5			
	• Pin-end connector (DIN 46231)		mm^2	2 x 1 ... 2.5			
	Protective conductor: Stranded with cable lug		mm^2	--	25 ... 70	35 ... 70	50 ... 120
CSA and UL rated data							
CSA rated data							
Uninterrupted current	Open		A	150	170	240	300
	Enclosed		A	135	153	215	270
Rated output power for induction motors at 60 Hz (enclosed)		115 V	hp	25	30	40	50
		230 V	hp	50	60	75	100
		460 V	hp	100	120	150	200
		575 V	hp	125	160	200	250
Overload relays	Type			3RB20 56	3RB20 56	3RB20 66	3RB20 66
	Setting range		A	50 ... 200	50 ... 200	50 ... 250	200 ... 540
NEMA/EEMAC size	Contactors			4	4	4	5
	Starters (= contactors + overload relay, enclosed)			3	4	4	5
UL rated data							
Uninterrupted current	Open		A	150	150	240	390
	Enclosed		A	135	135	215	350
Rated output power for induction motors with 60 Hz		115 V	hp	25	25	30	--
		230 V	hp	50	50	75	125
		460 V	hp	100	100	150	250
		575 V	hp	125	125	200	300[1)]
Overload relays	Type			3RB20 56	3RB20 56	3RB20 66	3RB20 66
	Setting range		A	50 ... 200	50 ... 200	50 ... 250	200 ... 540
NEMA/EEMAC size	Contactors			4	4	4	5
	Starters (= contactors + overload relay, enclosed)			3	4	4	5
Short-circuit protection devices							
• CLASS RK5 fuses			A	400	400	450	600
• Circuit-breakers acc. to UL 489			A	175	175	250	600

1) At AC 575/AC 600 V max. rated motor current 325 A and motor starting current 3250 A.

Overview

AC and DC operation

IEC 60947 (VDE 0660).

The contactors are suitable for use in any climate. The contactors with screw terminal are finger-safe according to EN 50274.

The contactors are available in versions with screw terminals, 6.3 mm plug connectors and solder pin connectors for soldering in printed circuit boards.

Design

Auxiliary contacts

Contact reliability

To switch voltages ≤ 110 V and currents ≤ 100 mA the 3TF2 contactor relays should be used as they guarantee a high level of contact reliability.

These auxiliary contacts are suitable for electronic circuits with currents ≥ 1 mA at a voltage of 17 V and higher.

Short-circuit protection of the contactors

Short-circuit protection of the contactors without overload relay, see Technical Specifications.

Version

The 3TF2 contactors are available with SIGUT screw terminals, 6.3 mm x 0.8 mm flat connectors and solder pin connectors.

The contactors with 6.3 mm x 0.8 mm flat connectors can be used in the plug-in socket with solder pin connectors for printed circuit boards. The contactors are coded and the plug-in socket is codable in order to ensure non-interchangeability.

Auxiliary switch blocks

The contactors with 1 auxiliary contact with screw terminals relays can be expanded by up to four contacts by the addition of mountable auxiliary switch blocks.

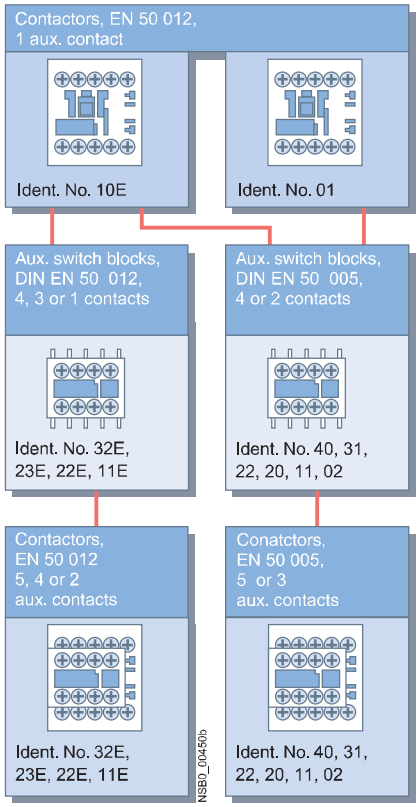
The contactors according to EN 50012 with identification number 10E can be expanded into contactors with 2, 4 and 5 auxiliary contacts according to EN 50012 using auxiliary switch blocks.

The identification numbers 11E, 22E, 23E and 32E on the auxiliary switch blocks apply to the complete contactors (see the illustration on the right). These auxiliary switch blocks cannot be combined with contactors with identification number 01E.

All contactors with screw terminals and 1 auxiliary contact according to EN 50012, identification number 10E and 01E, can be extended with auxiliary switch blocks 40, 31, 22, 20, 11 and 02 to obtain contactors with 3 or 5 auxiliary contacts according to EN 50005. The identification numbers on the auxiliary switch blocks apply only to the attached auxiliary switches.

3TF2 contactors, 3-pole, 2.2 ... 4 kW

3TF20 0 motor contactors according to EN 50012 or EN 50005



Overvoltage damping

RC elements, varistors, diodes or diode assemblies (combination of a diode and a Zener diode for short break times) can be plugged onto all 3TF2 contactors and auxiliary switch blocks with screw terminals from the front in order to damp opening surges in the coil. The device identification plate must be removed for this purpose. It can be snapped onto the attached surge suppressor.

Note

The opening times of the NO contacts and the closing times of the NC contacts increase if the contactor coils are protected against voltage peaks (noise suppression diode 6 ... 10 times, diode assemblies 2 ... 6 times, varistor +2 ... 5 ms).

Reversing mode

To use the 3TF2 AC-operated contactor in reversing or Dahlander mode an additional dead interval of 50 ms is required along with an NC contact interlock.

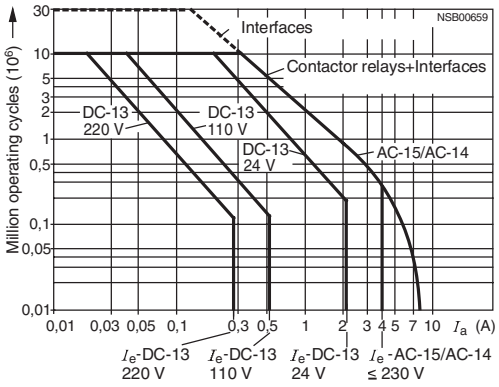
3TF2 contactors, 3-pole, 2.2 ... 4 kW

Technical specifications

Contactors Type **3TF2**

Endurance of the auxiliary contacts

The contact endurance for utilization category AC-12 or AC-15/AC-14 depends mainly on the breaking current. It is assumed that the operating mechanisms are switched randomly, i.e. not synchronized with the phase angle of the supply system.
Legend:
I_a = Breaking current
I_e = Rated operational current



3TF2

Endurance of the main contacts

The characteristic curves show the contact endurance of the contactors when switching inductive AC loads (AC-3) depending on the breaking current and rated operational voltage. It is assumed that the operating mechanisms are switched randomly, i.e. not synchronized with the phase angle of the supply system.
The rated operational current I_e complies with utilization category AC-4 (breaking six times the rated operational current) and is intended for a contact endurance of at least 200 000 operating cycles. If a shorter endurance is sufficient, the rated operational current I_e/AC-4 can be increased.
If the contacts are used for mixed operation, i.e. if normal switching (breaking the rated operational current according to utilization category AC-3) in combination with intermittent inching (breaking several times the rated operational current according to utilization category AC-4), the contact endurance can be calculated approximately from the following equation:

$$X = \frac{A}{1 + \frac{C}{100}\left(\frac{A}{B} - 1\right)}$$

Characters in the equation:
X = Contact endurance for mixed operation in operating cycles
A = Contact endurance for normal operation ($I_a = I_e$) in operating cycles
B = Contact endurance for inching (I_a = multiple of I_e) in operating cycles
C = Inching operations as a percentage of total switching operations

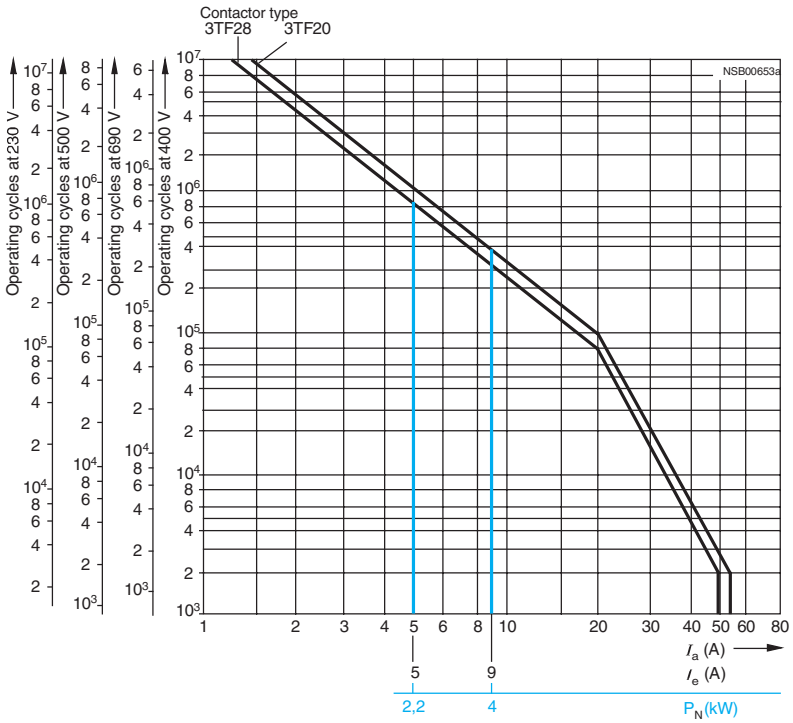


Diagram legend:
P_N= Rated output power for squirrel-cage motors at 400 V
I_a= Breaking current
I_e= Rated operational current

			3TF2 contactors, 3-pole, 2.2 ... 4 kW	
Contactors Type			3TF20/3TF28	3TF22/3TF29
General data				
Permissible mounting position	AC and DC operation		any	
Mechanical endurance	AC operation DC operation Auxiliary contact block	Operating cycles	10 million 30 million 10 million	
Rated insulation voltage U_i (pollution degree 3) • Screw terminal • Flat connector 6.3 mm x 0.8 mm • Solder pin connection		 V V V	 690 500 500	 690 [1] -- --
Rated impulse withstand voltage U_{imp} (pollution degree 3) • Screw terminal • Flat connector 6.3 mm x 0.8 mm • Solder pin connection		 kV kV kV	 8 6 6	 8 [2] -- --
Safe isolation between coil and main contacts (acc. to DIN VDE 0106 Part 101 and A1 [draft 02/89])		V	up to 300	
Mirror contacts A mirror contact is an auxiliary NC contact that cannot be closed simultaneously with a NO main contact.			Yes. This applies to both the basic unit as well as to between the basic unit and the mounted auxiliary switch block acc. to EN 60947-4-1, Appendix F	Yes. Acc. to EN 60947-4-1 Appendix F SUVA
Permissible ambient temperature [3]	During operation During storage	°C °C	-25 ... +55 -55 ... +80	
Degree of protection acc. to EN 60947-1 Appendix C			IP00 open IP20 for screw terminal IP40 coil assembly	
Touch protection acc. to EN 50274			Finger-safe for screw terminal	
Resistance to shock				
Without 3TX44 auxiliary switch block				
Rectangular pulse	AC operation DC operation	g/ms g/ms	8.3/5 and 5.2/10 11.3/5 and 9.2/10	-- --
Sine pulse	AC operation DC operation	g/ms g/ms	13/5 and 8/10 17.4/5 and 12.9/10	-- --
With 3TX44 auxiliary switch block				
Rectangular pulse	AC operation DC operation	g/ms g/ms	5/5 and 3.6/10 9/5 and 6.9/10	5/5 and 3.6/10 9/5 and 7.3/10
Sine pulse	AC operation DC operation	g/ms g/ms	7.8/5 and 5.6/10 13.9/5 and 10.1/10	7.8/5 and 5.6/10 14/5 and 11/10
Conductor cross-sections			[4]	
Short-circuit protection for contactors without overload relays				
Main circuit [5]				
• Fuse-links gL/gG NH 3NA, DIAZED 5SB, NEOZED 5SE - Acc. to IEC 60947-4/ DIN VDE 0660, Part 2	 Type of coordination "1": Type of coordination "2" [6] Weld-free	 A A A	 25 10 10	
• Miniature circuit-breaker with C-characteristic		A	10	
Auxiliary circuit Short-circuit current $I_k \geq 1$ kA				
• Fuse-links gL/gG DIAZED 5SB, NEOZED 5SE		A	6	

1) Auxiliary contacts 500 V.

2) Auxiliary contacts 6 kV.

3) Applies to 50/60 Hz coil:
At 50 Hz, 1.1 x U_s, side-by-side mounting and 100 % ON period the max. ambient temperature is +40 °C.

4) See conductor cross-sections.

5) According to excerpt from IEC 60947-4/DIN VDE 0660 Part 102
Type of coordination "1":
Destruction of the contactor and the overload relay is permissible. The contactor and/or overload relay can be replaced if necessary.
Type of coordination "2":
The overload relay must not suffer any damage. Contact welding on the contactor is permissible, however, if the contacts can be easily separated.

6) A short-circuit current of $I_q \leq 6$ kA applies to type of coordination "2".

3TF2 contactors, 3-pole, 2.2 ... 4 kW

Contactors Type			3TF2
Control			
Coil operating range[1]			0.8 ... 1.1 x U_S
Power consumption of the magnetic coils (when coil is cold and 1.0 x U_S)			
Standard version			
AC operation, 50 Hz	• Closing • p.f. • Closed • p.f.	VA VA 	15 0.41 6.8 0.42
AC operation, 60 Hz	• Closing • p.f. • Closed • p.f.	VA VA 	14.4 0.36 6.1 0.46
AC operation, 50/60 Hz[1]	• Closing • p.f. • Closed • p.f.	VA VA 	16.5/13.2 0.43/0.38 8.0/5.4 0.48/0.42
For USA and Canada			
AC operation, 50 Hz	• Closing • p.f. • Closed • p.f.	VA VA 	14.6 0.38 6.5 0.40
AC operation, 60 Hz	• Closing • p.f. • Closed • p.f.	VA VA 	14.4 0.30 6.0 0.44
DC operation	Closing = Closed	W	3
Permissible residual current of the electronic circuit[2] (for 0 signal)			
	AC operation DC operation	mA mA	≤ 3 x (230 V/U_S) ≤ 1 x (230 V/U_S)
Operating times at 0.8 ... 1.1 x U_S[3] Total break time = Opening delay + Arcing time Values apply with coil in cold state and at operating temperature for operating range			
• AC operation	Closing delay Opening delay	ms ms	5 ... 19 2 ... 22
Dead interval			To use the 3TF2 AC-operated contactor in reversing an additional dead interval of 50 ms is required along with an NC contact interlock.
• DC operation	Closing delay Opening delay	ms ms	16 ... 65 2 ... 5
Arcing time		ms	10 ... 15
Operating times at 1.0 x U_S[3]			
• AC operation	Closing delay Opening delay	ms ms	5 ... 18 3 ... 21
Dead interval			To use the 3TF2 AC-operated contactor in reversing an additional dead interval of 50 ms is required along with an NC contact interlock.
• DC operation	Closing delay Opening delay	ms ms	19 ... 31 3 ... 4
Arcing time		ms	10 ... 15

1) Applies to 50/60 Hz coil:
At 50 Hz, 1.1 x U_S, side-by-side mounting and 100% ON period the max. ambient temperature is +40 °C.

2) The 3TX4 490-1J additional load module is recommended for higher residual currents (see Accessories and Spare Parts).

3) The opening delay of the NO contact and the closing delay of the NC contact are increased if the contactor coils are attenuated against voltage peaks (noise suppression diode 6 to 10 times; diode assemblies 2 to 6 times, varistor +2 to 5 ms).

3TF2 contactors, 3-pole, 2.2 ... 4 kW

Contactors	Type			3TF28 3TF29	3TF20 ..-0..., 3TF22 ..-0...	3TF20 ..-3..., 3TF20 ..-6..., 3TF20 ..-7...
Size 00						
Main circuit						
AC capacity						
Utilization category AC-1 **Switching resistive loads**						
Rated operational current I_e (for 40 °C)	up to 400/380 V	A		18	18	18
	690/660 V	A		18	18	--
Rated operational current I_e (for 55 °C)	400/380 V	A		16	16	16
	690/660 V	A		16	16	--
Rated output power of AC loads	at 230/220 V	kW		6.0	6.0	6.0
p.f. = 1	400/380 V	kW		10	10	10
	500 V	kW		13	13	13
	690/660 V	kW		17	17	--
Minimum conductor cross-section for loads with I_e			mm^2	2.5	2.5	2.5
Utilization category AC-2 and AC-3						
Rated operational current I_e	up to 220 V	A		5.1	9.0	9.0
	230 V	A		5.1	9.0	9.0
	380 V	A		5.1	9.0	9.0
	400 V	A		5.1	8.4	8.4
	500 V	A		4.8	6.5	6.5
	660 V	A		4.8	5.2	--
	690 V	A		4.8	5.2	--
Rated output power for motors with slip-ring or squirrel-cage rotors at 50 Hz and 60 Hz and	at 110 V	kW		0.7	1.2	1.2
	115 V	kW		0.7	1.2	1.2
	120 V	kW		0.7	1.3	1.3
	127 V	kW		0.8	1.4	1.4
	200 V	kW		1.2	2.2	2.2
	220 V	kW		1.3	2.4	2.4
	230 V	kW		1.4	2.5	2.5
	240 V	kW		1.5	2.6	2.6
	380 V	kW		2.2	4.0	4.0
	400 V	kW		2.2	4.0	4.0
	415 V	kW		2.5	4.0	4.0
	440 V	kW		2.5	4.0	4.0
	460 V	kW		2.7	4.0	4.0
	500 V	kW		2.9	4.0	4.0
	575 V	kW		3.2	4.0	--
	660 V	kW		3.8	4.0	--
	690 V	kW		4.0	4.0	--
Utilization category AC-4						
(contact endurance approx. 200 000 operating cycles at I_a = 6 x I_e)						
Rated operational current I_e	up to 400 V	A		1.9	2.6	2.6
	690 V	A		1.4	1.8	--
Rated output power for motors with squirrel-cage rotor at 50 Hz and 60 Hz and	at 110 V	kW		0.23	0.32	0.32
	115 V	kW		0.24	0.33	0.33
	120 V	kW		0.26	0.35	0.35
Max. permissible rated operational current I_e/AC-4 ≙ I_e/AC-3 up to 500 V, for reduced contact endurance and reduced operating frequency	127 V	kW		0.27	0.37	0.37
	200 V	kW		0.42	0.58	0.58
	220 V	kW		0.47	0.64	0.64
	230 V	kW		0.49	0.67	0.67
	240 V	kW		0.51	0.70	0.70
	380 V	kW		0.81	1.10	1.10
	400 V	kW		0.85	1.15	1.15
	415 V	kW		0.93	1.20	1.20
	440 V	kW		1.0	1.27	1.27
	460 V	kW		1.0	1.33	1.33
	500 V	kW		1.1	1.45	1.45
	575 V	kW		1.0	1.30	--
	660 V	kW		0.86	1.10	--
	690 V	kW		0.89	1.15	--

3TF2 contactors, 3-pole, 2.2 ... 4 kW

Contactors	Type			3TF28 3TF29	3TF20 ..-0..., 3TF22 ..-0...	3TF20 ..-3..., 3TF20 ..-6..., 3TF20 ..-7...
Size 00						
Main circuit						
AC capacity						
Utilization category AC-5a **Switching gas discharge lamps** Per main conducting path at 230/220 V						
Rated output power Per lamp	Rated operational current Per lamp (A)					
Uncorrected						
L 18 W	0.37		units	43		
L 36 W	0.43		units	37		
L 58 W	0.67		units	23		
Lead-lag circuit						
L 18 W	011		units	144		
L 36 W	0.21		units	76		
L 58 W	0.32		units	50		
Switching gas discharge lamps with correction, solid-state ballast Per main conducting path at 230/220 V						
Rated output power per lamp	Capacitance (µF)	Rated operational current per lamp (A)				
Parallel correction						
L 18 W	4.5	0.11	units	22		
L 36 W	4.5	0.21	units	22		
L 58 W	7	0.31	units	14		
With solid-state ballast (single lamp)						
L 18 W	6.8	0.10	units	63		
L 36 W	6.8	0.18	units	35		
L 58 W	10	0.27	units	23		
With solid-state ballast (two lamps)						
L 18 W	10	0.18	units	35		
L 36 W	10	0.35	units	18		
L 58 W	22	0.52	units	12		
Utilization category AC-5b **Switching incandescent lamps** Per main conducting path at 230/220 V			kW	1.6		--
Utilization category AC-6a **Switching AC transformers**						
Rated operational current I_e						
• For inrush current n = 20		at 400 V	A	2.9	5.1	5.1
• For inrush current n = 30		at 400 V	A	1.9	3.3	3.3
Rated power P						
• For inrush current n = 20		up to 230/220 V	kVA	1.14	2.0	2.0
		400/380 V	kVA	2	3.5	3.5
		500 V	kVA	4.1	4.6	4.6
		690/660 V	kVA	5.4	6.0	--
• For inrush current n = 30		up to 230/220 V	kVA	0.74	1.3	1.3
		400/380 V	kVA	1.3	2.3	2.3
		500 V	kVA	2.8	3.1	3.1
		690/660 V	kVA	3.6	4.0	--
For deviating inrush current factors x, the power must be recalculated as follows: $P_x = P_{n30} \times (30/x)$						
Utilization category AC-6b **Switching low-inductance (low-loss, metallized dielectric) AC capacitors**				No switching capacity		
Utilization category AC-7a **Switching low inductive loads in household appliances**						
Rated operational current I_e (for 55 °C)		at 400/380 V	A	16	16	16
		690/660 V	A	16	16	--
Rated output power at 50 and 60 Hz		at 230/220 V	kW	6	6	6
		400/380 V	kW	10	10	10
Minimum conductor cross-section for loads with I_e			mm^2	2.5	2.5	2.5
Utilization category AC-7b **Switching motor loads in household appliances**						
Rated operational current I_e		up to 220 V	A	5.1	9.0	9.0
		230 V	A	5.1	9.0	9.0
		380 V	A	5.1	9.0	9.0
		400 V	A	5.1	8.4	8.4
Rated output power of motors at 50 Hz and 60 Hz and		at 110 V	kW	0.68	1.2	1.2
		220 V	kW	1.3	2.4	2.4
		230 V	kW	1.4	2.5	2.5
		240 V	kW	1.5	2.6	2.6
		380 V	kW	2.2	4.0	4.0
		400 V	kW	2.4	4.0	4.0

3TF2 contactors, 3-pole, 2.2 ... 4 kW

Contactors	Type			3TF28 3TF29	3TF20 ..-0..., 3TF22 ..-0...	3TF20 ..-3..., 3TF20 ..-6..., 3TF20 ..-7...
Size 00						
Main circuit						
Load rating with DC						
Utilization category DC-1 **Switching resistive loads** (contact endurance 0.1 x 106 operating cycles; $L/R \leq 1$ ms)						
Rated operational current I_e (for 55 °C)						
• 1 current path		up to 24 V	A	10	16	16
		60 V	A	4	6	6
		110 V	A	1.5	2	2
		220/240 V	A	0.6	1	1
• 2 current paths in series		up to 24 V	A	10	16	16
		60 V	A	10	16	16
		110 V	A	4	6	6
		220/240 V	A	1.5	2	2
• 3 current paths in series		up to 24 V	A	10	16	16
		60 V	A	10	16	16
		110 V	A	10	16	16
		220/240 V	A	4	6	6
Utilization category DC-3 and DC-5 **Shunt-wound and series-wound motors** ($L/R \leq 15$ ms)						
Rated operational current I_e (for 55 °C)						
• 1 current path		up to 24 V	A	4	6	6
		60 V	A	1.8	3	3
		110 V	A	0.3	0.5	0.5
		220/240 V	A	--	0.1	0.1
• 2 current paths in series		up to 24 V	A	6	10	10
		60 V	A	3	5	5
		110 V	A	1.5	2	2
		220/240 V	A	0.3	0.5	0.5
• 3 current paths in series		up to 24 V	A	10	16	16
		60 V	A	10	16	16
		110 V	A	10	16	16
		220/240 V	A	1.5	2	2
Thermal load capacity		10 s current	A	70		
Power loss per conducting path		for I_e/AC-3	W	0.3		
Operating frequency						
Operating frequency *z* in operating cycles/hour						
• Contactors without overload relays	No-load operating frequency		h^{-1}	10000		
Dependence of the operating frequency z' on the operational current I' and operational voltage U': $z' = z \times (I_e/I') \times (400\ V/U')^{1.5}$ 1/h	AC-1		h^{-1}	1000		
	AC-2		h^{-1}	500		
	AC-3		h^{-1}	1000		
• Contactors with overload relays (mean value)			h^{-1}	15		
Conductor cross-sections						
Screw terminals	**Main and auxiliary conductors**					
	Solid		mm^2	2 x (0.5 ... 2.5), 1 x 4 2 x (20 ... 14) AWG, 1 x 12 AWG		
	Finely stranded with end sleeve		mm^2	2 x (0.5 ... 1.5), 1 x 2.5		
	Pin-end connector (DIN 46231)		mm^2	1 x 1 ... 2.5		
	Terminal screw			M3		
Prescribed tightening torque for terminal screws			Nm	0.8 ... 1.3 (7 ... 11 lb.in)		
Flat connector						
When using a quick-connect terminal	6.3 ... 1		mm^2	0.5 ... 1		
Finely stranded	6.3 ... 2.5		mm^2	1 ... 2.5		
Solder pin connection				Only for printed circuit boards		

3TF2 contactors, 3 pole, 2.2 ... 4kW

Contactors Size 00	Type			3TF20 ..-0...	3TF20 ..-3..., 3TF20 ..-6..., 3TF20 ..-7...
cULus and CSA rated data of the 3TF20 contactors					
Rated insulation voltage U_i			V AC	600	300
Uninterrupted current	Open and enclosed		A	16	16 (10 for solder pin connection)
Maximum horsepower ratings (cULus and CSA approved values) Rated output power for induction motors with 60 Hz					
	1-phase	at 115 V	hp	0.5	--
		200 V	hp	1	1
		230 V	hp	1.5	1
		460/575 V	hp	--	--
	3-phase	at 115 V	hp	--	--
		200 V	hp	3	3 (1 for 3TF20 ..-6)
		230 V	hp	3	3 (1 for 3TF20 ..-6)
		460/575 V	hp	5	--
Overload relays	Type/ Setting range			3UA7/EB 8 ... 10 A	

Contactors Size 00	Type			3TF2
Rated data of the auxiliary contacts acc. to IEC 60947-5-1/DIN VDE 0660 Part 200				
Rated insulation voltage U_i (pollution degree 3)			V	690
Continuous thermal current I_{th} = Rated operational current I_e/AC-12			A	10
AC load Rated operational current I_e/AC-15/AC-14				
For rated operational voltage U_e		24 V	A	4
		110 V	A	4
		125 V	A	4
		220 V	A	4
		230 V	A	4
		380 V	A	3
		400 V	A	3
		500 V	A	2
		660 V	A	1
		690 V	A	1
DC load Rated operational current I_e/DC-12				
For rated operational voltage U_e		24 V	A	4
		48 V	A	2.2
		110 V	A	1.1
		125 V	A	1.1
		220 V	A	0.5
		440 V	A	--
		600 V	A	--
Rated operational current I_e/DC-13				
For rated operational voltage U_e		24 V	A	2.1
		48 V	A	1.1
		110 V	A	0.52
		125 V	A	0.52
		220 V	A	0.27
		440 V	A	--
		600 V	A	--
cULus, CSA and UL rated data of the auxiliary contacts				
Rated voltage, max.			V AC	600
Auxiliary switch blocks, max.			V AC	300
Switching capacity				A 600, Q 300
Uninterrupted current at 240 V AC			A	10

Notes

3RA13 Reversing Contactor Assemblies

3RA13 complete units, 3 ... 45 kW

Overview

The 3RA13 reversing contactor assemblies can be ordered as follows:

Sizes S00 to S3

- Fully wired and tested, with mechanical and electrical interlock (for voltages > 500 V, a dead interval of 50 ms on reversing must be taken into account)

Sizes S00 to S12

- As components for customer assembly.

There is also a range of accessories (auxiliary switch blocks, surge suppressors, etc.) that must be ordered separately.

For overload relays for motor protection, see "Protection Equipment: Overload Relays".

The 3RA13 contactor assemblies have screw terminals and are suitable for screwing or snapping onto 35 mm standard mounting rails.

Complete units

The fully wired reversing contactor assemblies are suitable for use in any climate. They are finger-safe according to EN 50274.

The contactor assemblies consist of 2 contactors with the same power, with one NC contact in the basic unit. The contactors are mechanically and electrically interlocked (NC contact interlock).

For motor protection, either 3RU11 overload relays for direct mounting or individual mounting or thermistor motor protection tripping units must be ordered separately.

Components for customer assembly

Installation kits for all sizes are available for customer assembly of reversing contactor assemblies.

Contactors, overload relays, the mechanical interlock (as of size S0) and – for momentary-contact operation – auxiliary switch blocks for latching must be ordered separately.

Rated data AC-2 and AC-3 for AC 50 Hz 400 V		Size	Order No.					
Rating	Operational current I_e		Contactor	Mechanical interlock[1]	Mechanical interlock[2]	Mechanical interlock[3]	Installation kit	**Fully wired and tested contactor assemblies**
kW	A							
3	7	**S00**	3RT10 15	--[4]	--	--	3RA19 13-2A[5]	**3RA13 15-8XB30-1 . .**
4	9		3RT10 16					**3RA13 16-8XB30-1 . .**
5.5	12		3RT10 17					**3RA13 17-8XB30-1 . .**
5.5	12	**S0**	3RT10 24	3RA19 24-1A	3RA19 24-2B	--	3RA19 23-2A[6]	**3RA13 24-8XB30-1 . .**
7.5	17		3RT10 25					**3RA13 25-8XB30-1 . .**
11	25		3RT10 26					**3RA13 26-8XB30-1 . .**
15	32	**S2**	3RT10 34	3RA19 24-1A	3RA19 24-2B	--	3RA19 33-2A[7]	**3RA13 34-8XB30-1 . .**
18.5	40		3RT10 35					**3RA13 35-8XB30-1 . .**
22	50		3RT10 36					**3RA13 36-8XB30-1 . .**
30	65	**S3**	3RT10 44	3RA19 24-1A	3RA19 24-2B	--	3RA19 43-2A[7]	**3RA13 44-8XB30-1 . .**
37	80		3RT10 45					**3RA13 45-8XB30-1 . .**
45	95		3RT10 46					**3RA13 46-8XB30-1 . .**
55	115	**S6**	3RT10 54	--	--	3RA19 54-2A	3RA19 53-2A[8]	**--**
75	150		3RT10 55					
90	185		3RT10 56					
110	225	**S10**	3RT10 64	--	--	3RA19 54-2A	3RA19 63-2A[8]	**--**
132	265		3RT10 65					
160	300		3RT10 66					
200	400	**S12**	3RT10 75	--	--	3RA19 54-2A	3RA19 73-2A[8]	**--**
250	500		3RT10 76	--	--			

1) Can be mounted onto the front.

2) Laterally mountable with one auxiliary contact.

3) Laterally mountable without auxiliary contact.

4) Interlock can only be ordered with installation kit.

5) Installation kit contains: Mechanical interlock; connecting clips for 2 contactors; wiring connectors on the top and bottom.

6) Installation kit contains: Wiring connectors on the top and bottom.

7) Installation kit contains: 2 connecting clips for contactors; wiring connectors on the top and bottom.

8) Installation kit contains: Wiring module on the top and bottom.

Function

The operating times of the individual 3RT10 contactors are rated in such a way that no overlapping of the contact making and the arcing time between two contactors can occur on reversing, providing they are interlocked by way of their auxiliary switches (NC contact interlock) and the mechanical interlock. An additional dead interval on reversing of 50 ms is necessary at voltages > 500 V.

The operating times of the individual contactors are not affected by the mechanical interlock.

The following points should be noted:

Size S00

- For maintained-contact operation:
  Use contactors with an NC contact in the basic unit for the electrical interlock.
- For momentary-contact operation:
  Use contactors with an NC contact in the basic unit for the electrical interlock; in addition, an auxiliary switch block with at least one NO contact for latching is required per contactor.

Sizes S0 to S3

- For maintained-contact operation:
  The contactors have no auxiliary contact in the basic unit; NC contacts for the electrical interlock are therefore integrated in the mechanical interlock that can be mounted on the side of each contactor (one contact each for the left and right-hand contactors).
- For momentary-contact operation:
  Electrical interlock as for maintained-contact operation; for the purpose of latching an auxiliary contact with an NO contact is additionally required for each contactor. This contact can be snapped onto the top of the contactors. Alternatively, auxiliary switch blocks mounted on the side can be used; they must be fitted onto the outside of each contactor.

If the front-mounted mechanical interlock is used for size S0 to S3 contactors, two location holes for single-pole auxiliary switch blocks are provided on the front of each S0 or S2 contactor, while three additional, single-pole auxiliary switch blocks can be snapped onto S3 contactors. The maximum auxiliary switch complements per contactor must not be exceeded.

When size S2 and S3 contactors are combined with a front-mounted mechanical interlock, the installation sets for 3RA19 33–2B and 3RA19 43–2B contactor assemblies cannot be used.

Sizes S6 to S12

To insert the mechanical interlock, the prestamped location holes positioned opposite on the contactor must be knocked out. The internal auxiliary contacts (up to 1 NO + 1 NC per contactor) can be used for the electrical interlock and latching. The mechanical interlock itself does not contain any auxiliary contacts. Additional auxiliary contacts can be used on the outside and front (on the front in the case of 3RT10) of the reversing contactor assembly.

Overvoltage damping

Sizes S00 to S3

All contactor assemblies can be fitted with RC elements or varistors for damping opening surges in the coil.

As with the individual contactors, the surge suppressors can either be plugged onto the top of the contactors (S00) or fitted onto the coil terminals on the top or bottom (S0 to S3).

Sizes S6 to S12

The contactors are fitted with varistors as standard.

Technical specifications

The technical specifications are identical to those of the 3RT10 .. contactors listed on Page 3/14 onwards.

The CSA and UL approvals only apply to the complete contactor assemblies and not to the components for customer assembly.

3RA14 Contactor Assemblies for Wye-Delta Starting

3RA14 complete units, 3 ... 75 kW

Overview

The 3RA14 contactor assemblies for wye-delta starting can be ordered as follows:

Sizes S00 to S3:

- Fully wired and tested, with electrical interlock, dead interval of up to 10 s on reversing (size S00 with electrical and mechanical interlocks)

Sizes S00 to S12:

- As components for customer assembly.

A dead interval of 50 ms on reversing is already integrated in the time relay function.

There is also a range of accessories (auxiliary switch blocks, surge suppressors, etc.) that must be ordered separately.

For overload relays for motor protection, see "Protection Equipment: Overload Relays -> 3RB2 Solid-State Overload Relays".

The 3RA14 contactor assemblies have screw terminals and are suitable for screwing or snapping onto 35 mm standard mounting rails.

Fully wired and tested 3RA14 contactor assemblies have one unassigned NO contact which is mounted onto the front of the K3 delta contactor.

A solid-state time-delay auxiliary switch block is snapped onto the front of the complete contactor assemblies, size S00 up to 7.5 kW, while a timing relay is mounted onto the side of sizes S0 to S3, 11 kW to 75 kW.

Rated data at AC 50 Hz 400 V			Size				Accessories for customer assembly	
Rating kW	Operational current I_e A	Motor current A		Line/delta contactor	Wye contactor	**Order No. complete**	Timing relay	Installation kit A, for double infeed
5.5	12	1.9 ... 2.8	**S00-S00-S00**	3RT10 15	3RT10 15	**3RA14 15-8XB31-1...**	3RT19 16-2G.51	--
		2.4 ... 3.4						
		3.1 ... 4.3						
		3.8 ... 5.5						
		4.8 ... 6.9						
		6 ... 8.6						
7.5	17	7.8 ... 10.9		3RT10 17				
		9.5 ... 13.8						
		12.1 ... 17				**3RA141 6-8XB31-1...**	3RP15 74-1N.30	
11	25	3.1 ... 4.3	**S0-S0-S0**	3RT10 24	3RT10 24	**3RA14 23-8XC21-1...**	3RP15 74-1N.30	--
		3.8 ... 5.5						
		4.8 ... 6.9						
		6 ... 8.6						
		7.8 ... 10.9						
		9.5 ... 13.8						
		12.1 ... 17.2						
		15.5 ... 21.5						
		19 ... 25						
15	32	24.1 ... 34		3RT10 26		**3RA14 25-8XC21-1...**		
		29.3 ... 37.9						
18.5	40	34.5 ... 40						
22	50	9.5 ... 13.8	**S2-S2-S0**	3RT10 34	3RT10 26	**3RA14 34-8XC21-1...**	3RP15 74-1N.30	3RA19 33-2C[3]
		12.1 ... 17.2						
		15.5 ... 21.5						
		19 ... 27.6						
		24.1 ... 34						
		31 ... 43						
		37.9 ... 55.2						
		48.3 ... 65		3RT10 35		--		
37	80	62.1 ... 77.8	**S2-S2-S2**		3RT10 34	**3RA14 35-8XC21-1...**		3RA19 33-2B[3]
45	86	69 ... 86		3RT10 36		**3RA14 36-8XC21-1...**		
55	115	31 ... 43.1	**S3-S3-S2**	3RT10 44	3RT10 35	**3RA14 44-8XC21-1...**	3RP15 74-1N.30	3RA19 43-2C[3]
		37.9 ... 55.2						
		48.3 ... 69						
		62.1 ... 77.6						
		77.6 ... 108.6						
75	150	98.3 ... 129.3		3RT10 45	3RT10 36	**3RA14 45-8XC21-1...**		
		120.7 ... 150						
90	160	86 ... 160	**S6-S6-S3**	3RT10 54	3RT10 44	--	3RP15 74-1N.30	--
110	195	86 ... 195						
132	230	86 ... 230		3RT10 55	3RT10 45			
160	280	86 ... 280		3RT10 56	3RT10 46			
200	350	95 ... 350	**S10-S10-S6**	3RT10 64	3RT10 54	--	3RP15 74-1N.30	--
250	430	95 ... 430		3RT10 65	3RT10 55			
315	540	277 ... 540	**S12-S12-S10**	3RT10 75	3RT10 64	--	3RP15 74-1N.30	--
355	610	277 ... 610						
400	690	277 ... 690			3RT10 65			
500	850	277 ... 850		3RT10 76	3RT10 66			

1) Installation kit contains mechanical interlock, 3 connecting clips; wiring connectors on the top (connection between mains and delta contactor) and on the bottom (connection between delta and wye contactor); star jumper.

2) The installation kit contains 5 connecting clips; wiring connectors on the top (connection between mains and delta contactor) and on the bottom (connection between delta and wye contactor); star jumper.

3) Installation kit contains wiring connector on the bottom (connection between delta and wye contactor) and star jumper.

4) Wiring connector on top from reversing contactor assembly (note conductor cross-sections).

5) Only use wiring connector on top of reversing contactor assembly (note conductor cross-sections); star jumpers must be ordered separately.

3RA14 complete units, 3 ... 75 kW

Components for customer assembly

Installation kits with wiring connectors and, if necessary, mechanical connectors are available for contactor assemblies for wye-delta starting. Contactors, overload relays, wye-delta timing relays, auxiliary switches for electrical interlock – if required also supply terminals, mechanical interlocks (exception: In the case of the kit for size S00 contactor assemblies the mechanical interlock between the delta contactor and the wye contactor is included in the kit) and base plates – must be ordered separately.

The wiring installation kits for sizes S00 and S0 contain the top and bottom main conducting path connections between the line and delta contactors (top) and between the delta and wye contactors (bottom).

In the case of sizes S2 to S12 only the bottom main conducting path connection between the delta and wye contactors is included in the wiring connector, owing to the larger conductor cross-section at the infeed.

Motor protection

Overload relays or thermistor motor protection trip units can be used for overload protection.

The overload relay can be either mounted onto the line contactor or separately fitted. It must be set to 0.58 times the rated motor current.

Note:

The selection of contactor types refers to fused configurations (see table on page 3/86).

			Overload relay, thermal (CLASS 10 trip class)		Overload relay, solid-state (CLASS 10 trip class)	
Installation kit B, for single infeed	Star jumper	Base plates	Setting range A	Order No.	Setting range A	Order No.
3RA19 13-2B[1]	3RT19 16-4BA31	--	1.1 ... 1.6	3RU11 16-1AB0	0.32 ... 1.25	3RB20 16-1NB0
			1.4 ... 2	3RU11 16-1BB0	1 ... 4	3RB20 16-1PB0
			1.8 ... 2.5	3RU11 16-1CB0		
			2.2 ... 3.2	3RU11 16-1DB0		
			2.8 ... 4	3RU11 16-1EB0		
			3.5 ... 5	3RU11 16-1FB0	3 ... 12	3RB20 16-1SB0
			4.5 ... 6.3	3RU11 16-1GB0		
			5.5 ... 8	3RU11 16-1HB0		
			7 ... 10	3RU11 16-1JB0		
3RA19 23-2B[2]	3RT19 26-4BA31	--	1.8 ... 2.5	3RU11 26-1CB0	1 ... 4	3RB20 16-1PB0[6]
			2.2 ... 3.2	3RU11 26-1DB0		
			2.8 ... 4	3RU11 26-1EB0		
			3.5 ... 5	3RU11 26-1FB0		
			4.5 ... 6.3	3RU11 26-1GB0	3 ... 12	3RB20 26-1SB0
			5.5 ... 8	3RU11 26-1HB0		
			7 ... 10	3RU11 26-1JB0		
			9 ... 12.5	3RU11 26-1KB0	6 ... 25	3RB20 26-1QB0
			11 ... 16	3RU11 26-4AB0		
			14 ... 20	3RU11 26-4BB0		
			17 ... 22	3RU11 26-4CB0		
			20 ... 25	3RU11 26-4DB0		
3RA19 33-3D[4]	3RT19 26-4BA31	3RA19 32-2E	5.5 ... 8	3RU11 36-1HB0	3 ... 12	3RB20 26-1SB0[7]
			7 ... 10	3RU11 36-1JB0	6 ... 25	3RB20 36-1QB0
			9 ... 12.5	3RU11 36-1KB0		
			11 ... 16	3RU11 36-4AB0		
			14 ... 20	3RU11 36-4BB0		
			18 ... 25	3RU11 36-4DB0		
			22 ... 32	3RU11 36-4EB0	12.5 ... 50	3RB20 36-1UB0
			28 ... 40	3RU11 36-4FB0		
	3RT19 36-4BA31	3RA19 32-2F	36 ... 45	3RU11 36-4GB0		
			40 ... 50	3RU11 36-4HB0		
3RA19 43-3D[4]	3RT19 36-4BA31	3RA19 42-2E	18 ... 25	3RU11 46-4DB0	12.5 ... 50	3RB20 46-1UB0
			22 ... 32	3RU11 46-4EB0		
			28 ... 40	3RU11 46-4FB0		
			36 ... 45	3RU11 46-4HB0		
			45 ... 63	3RU11 46-4JB0	25 ... 100	3RB20 46-1EB0
			57 ... 75	3RU11 46-4KB0		
			70 ... 90	3RU11 46-4LB0		
3RA19 53-3D[4]	3RT19 46-4BA31	3RA19 52-2E	--	--	50 ... 200	3RB20 56-1FC2
3RA19 63-3D[4]	3RT19 56-4BA31	3RA19 62-2E	--	--	55 ... 250	3RB20 66-1GC2
3RA19 73-2A[5]	3RT19 66-4BA31	3RA19 72-2E	--	--	160 ... 630	3RB20 66-1MC2

6) Only stand-alone installations possible in combination with the 3RB29 13-0AA1 terminal bracket for stand-alone installation.

7) Only stand-alone installation possible in combination with the 3RB29 23-0AA1 terminal bracket for stand-alone installation.

3RA14 Contactor Assemblies for Wye-Delta Starting

3RA14 complete units, 3 ... 75 kW

Function

Wye-delta starting can only be used either if the motor normally operates in a Δ connection or starts softly or if the load torque during Y starting is low and does not increase sharply. On the Y step the motors can carry approximately 50 % (class KL 16) or 30 % (class KL 10) of their rated torque; The starting torque is approximately 1/3 of that during direct on-line starting. The starting current is approximately 2 to 2.7 times the rated motor current.

The changeover from Y to Δ must not be effected until the motor has run up to rated speed. Drives which require this changeover to be performed earlier are unsuitable for wye-delta starting.

The ratings given in the table are only applicable to motors with a starting current ratio $I_A \leq 8.4 \times I_N$ and using either a 3RT19 16-2G or 3RT19 26-2G solid-state time-delay auxiliary switch block with a wye-delta function or a 3RP15 74.

wye-delta time relay with a dead interval on reversing of approximately 50 ms.

Overvoltage damping

Sizes S00 to S3:

All contactor assemblies can be fitted with RC elements, varistors or diode assemblies for damping opening surges in the coil.

As with the individual contactors, the surge suppressors can either be plugged onto the top of the contactors (S00) or fitted onto the coil terminals on the top or bottom (S0 to S3).

Sizes S6 to S12:

The contactors are fitted with varistors as standard.

Technical specifications

Short-circuit protection with fuses for motor feeders with short-circuit currents up to 50 kA and 690 V
For overload relays see Protection Equipment: Overload Relays -> 3RB2 Solid-State Overload Relays.

Rating	Sizes of contactors K1-K3-K2	Rated motor current	Overload relay	Setting range (the overload relays must be set to 0.58 times the rated motor current)	Permissible short-circuit fuses for starters, comprising contactor assemblies and overload relays					
					Single or double infeed[1] Fuse links LV HRC DIAZED NEOZED Type 3NA Type 5SB Type 5SE gL/gG operational class Type of coordination		NH TYPE 3ND Operational class aM Type of coordination	® listed fuses CLASS RK5/L	British Standard Fuses BS88 Type of coordination	
					"1"	"2"	"2"		"1"	"2"
kW		A	Type	A	A	A	A	A	A	A
5.5	S00-S00-S00	12	3RU11 16-1HB0	5.5 ... 8	35	20	10	30	35	20
7.5	S00-S00-S00	17	3RU11 16-1JB0	7 ... 10	35	20	16	40	35	20
11	S0-S0-S0	25	3RU11 26-4AB0	11 ... 16	63	25	20	60	63	25
15	S0-S0-S0	32	3RU11 26-4BB0	14 ... 20	100	35	20	80	100	35
18.5	S0-S0-S0	40	3RU11 26-4DB0	20 ... 25	100	35	20	100	100	35
22	S2-S2-S0	50	3RU11 36-4EB0	22 ... 32	125	63	35	125	125	63
30	S2-S2-S0	65	3RU11 36-4FB0	28 ... 40	125	63	50	150	125	63
37	S2-S2-S2	80	3RU11 36-4GB0	36 ... 45	125	63	50	175	125	63
45	S2-S2-S2	86	3RU11 36-4HB0	40 ... 50	160	80	50	200	160	80
55	S3-S3-S2	115	3RU11 46-4KB0	57 ... 75	250	125	63	300	250	125
75	S3-S3-S2	150	3RU11 46-4LB0	70 ... 90	250	160	80	350	250	160
90	S6-S6-S3	160	3RB20 56-1FC2	50 ... 200	355	315	160	450	355	250
110	S6-S6-S3	195	3RB20 56-1FC2	50 ... 200	355	315	160	450	355	250
132	S6-S6-S3	230	3RB20 56-1FC2	50 ... 200	355	315	160	500	355	315
160	S6-S6-S3	280	3RB20 56-1FC2	50 ... 200	355	315	200	500	355	315
200	S10-S10-S6	350	3RB20 66-1GC2	55 ... 250	500	400	250	700	500	400
250	S10-S10-S6	430	3RB20 66-1MC2	160 ... 630	500	400	315	800	500	400
315	S12-S12-S10	540	3RB20 66-1MC2	160 ... 630	630	500	400	1000	630	450
355	S12-S12-S10	610	3RB20 66-1MC2	160 ... 630	630	500	400	1000	630	450
400	S12-S12-S10	690	3RB20 66-1MC2	160 ... 630	630	500	400	1000	630	450
500	S12-S12-S10	850	3RB20 66-1MC2	160 ... 630	630	500	500	1200	630	500

1) The maximum rated motor current must not be exceeded.

Technical specifications

Starters	Sizes **S..-S..-S..** Type **3RA.. ..**			**00-00-00 14 15**	**00-00-00 14 16**	**0-0-0 14 23**	**0-0-0 14 25**	**2-2-0 14 34**	**2-2-2 14 35**	**2-2-2 14 36**	**3-3-2 14 44**	**3-3-2 14 45**
All technical specifications not mentioned in the table below are identical to those of the individual 3RT contactors and 3RU overload relays												
Mechanical endurance			Operating cycles	3 million								
Short-circuit protection without overload relay				1)								
Maximum rated current of the fuse												
Main circuit Fuse links gL/gG NH 3NA, DIAZED 5SB, NEOZED 5SE Single or double infeed												
Acc. to IEC 60947-4-1/ EN 60947-4-1	Type of coordination "1" Type of coordination "2"		A A	35 20	35 20	63 25	100 35	125 63	125 63	160 80	250 125	250 160
Control circuit Fuse links, gL/gG DIAZED 5SB, NEOZED 5SE (short-circuit current $I_k \leq 1$ kA)			A A	10 6[2], if the auxiliary contact of the overload relay is connected in the contactor coil circuit								
Miniature circuit-breaker with C-characteristic			A A	10 6[2], if the auxiliary contact of the overload relay is connected in the contactor coil circuit								
Size of contactors	K1 Line contactor K3 delta contactor K2 wye contactor		Type 3RT Type 3RT Type 3RT	10 15 10 15 10 15	10 17 10 17 10 15	10 24 10 24 10 24	10 26 10 26 10 24	10 34 10 34 10 26	10 35 10 35 10 34	10 36 10 36 10 34	10 44 10 44 10 35	10 45 10 45 10 36
Unassigned auxiliary contacts of the contactors				3)								
Current-carrying capacity with reversing time up to 10 s												
Rated operational current I_e		at 400 V 500 V 690 V	A A A	12 8.7 6.9	17 11.3 9	25 20.8 20.8	40 31.2 22.5	65 55.4 53.7	80 69.3 69.3	86 86 69.3	115 112.6 98.7	150 138.6 138.6
Rated output power for induction motors at 50 Hz and 60 Hz and		at 230 V 400 V 500 V 690 V 1000 V	kW kW kW kW kW	3.3 5.8 5.3 5.8 --	4.7 8.2 6.9 7.5 --	7.2 12.5 13 18 --	12 21 20.5 20.4 --	20.4 35 38 51 --	25.5 44 48 66 --	27.8 48 60 67 --	37 65 80 97 --	49 85 98 136 --
Operating frequency with overload relay			h^{-1}	15	15	15	15	15	15	15	15	15
Current-carrying capacity with reversing time up to 15 s												
Rated operational current I_e		at 400 V 500 V 690 V	A A A	12 8.7 6.9	17 11.3 9	25 20.8 20.8	31 31 22.5	44 44 44	57 57 57	67 67 67	97 97 97	106 106 106
Rated output power for induction motors at 50 Hz and 60 Hz and		at 230 V 400 V 500 V 690 V 1000 V	kW kW kW kW kW	3.3 5.8 5.3 5.8 --	4.7 8.2 6.9 7.5 --	7.2 12.5 13 18 --	9.4 16.3 20.4 20.4 --	13.8 24 30 42 --	18.2 31.6 40 55 --	21.6 38 47 65 --	32 55 69 95 --	35 60 75 104 --
Operating frequency with overload relay			h^{-1}	15	15	15	15	15	15	15	15	15
Current-carrying capacity with reversing time up to 20 s												
Rated operational current I_e		at 400 V 500 V 690 V	A A A	12 8.7 6.9	17 11.3 9	25 20.8 20.8	28 28 22.5	39 39 39	51 51 51	57 57 57	85 85 85	92 92 92
Rated output power for induction motors at 50 Hz and 60 Hz and		at 230 V 400 V 500 V 690 V 1000 V	kW kW kW kW kW	3.3 5.8 5.3 5.8 --	4.7 8.2 6.9 7.5 --	7.2 12.5 13 18 --	8.5 14.7 18.4 20.4 --	12.2 21.3 26.7 37 --	16.3 28 35 49 --	18.4 32 40 55 --	28 48 60 83 --	30 52 65 90 --
Operating frequency with overload relay			h^{-1}	15	15	15	15	15	15	15	15	15

1) Short-circuit protection with overload relays, see Protection Equipment: Overload Relays -> 3RB2 Solid-State Overload Relays.

2) Up to $I_k < 0.5$ kA; ≤ 260 V.

3) See circuit diagrams of the control circuit on page 3/228.

3TD6 reversing contactor assemblies, 335 kW

Overview

The contactor assemblies are suitable for use in any climate and the contactors are mechanically interlocked. They are finger-safe according to EN 50274.

Complete units and components for customer assembly are available. For motor protection, either overload relays for individual installation or thermistor motor protection trip units must be ordered separately.

Complete units

3TD68 contactor assemblies each consist of two mechanically interlocked 3TF68 contactors. Electrical interlocking is wired. The main and control circuits are wired according to the circuit diagrams.

An internal circuit diagram, a type designation and an identification plate are provided on a common cover.

Auxiliary contacts

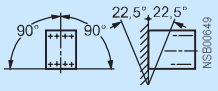
The contactor assemblies each have 2 NO + 2 NC contacts per contactor. NO + 1 NC contacts with momentary-contact operation and 2 NO + 1 NC contacts with continuous operation are unassigned.

Function

The operating times of the individual contactors are rated in such a way that no overlapping of the contact making and the arcing time between two contactors can occur on reversing, providing they are interlocked via their auxiliary switches and the operating mechanisms.

The operating times of the individual contactors are not affected by the mechanical interlock.

Technical specifications

Contactor	Type			3TD68
General data				
Permissible mounting position, assembly note[1] The contactors are designed for operation on a vertical mounting surface.				
CSA and UL rated data				
Rated insulation voltage			V AC	600
Uninterrupted current enclosed			A	550
Maximum horsepower ratings (CSA and UL approved values)				
Rated output power for induction motors with 60 Hz		at 200 V	hp	200
		230 V	hp	229
		460 V	hp	464
		575 V	hp	582
NEMA/EEMAC ratings	NEMA/EEMAC SIZE			6
Uninterrupted current	Open		A	600
	Enclosed		A	540
Rated output power for induction motors at 60 Hz		at 200 V	hp	150
		230 V	hp	200
		460 V	hp	400
		575 V	hp	400
Overload relay	Type			3RB20 66
	Setting range		A	160 ... 630

For short-circuit protection with overload relays see Protection Equipment: Overload Relays -> 3RB2 Solid-State Overload Relays.
The technical specifications are identical to those of the 3TF68 contactors.
The mechanical endurance is 5 million operating cycles for 3TD68.

For the unassigned auxiliary contacts of the contactors, see "Circuit Diagrams of the Control Circuits".

1) If the contactors are mounted at a 90° angle (conducting paths horizontally one above the other), the following reductions apply: Operating frequency: to 80 % of the standard values.

3TE6 contactor assemblies for wye-delta starting, 630 kW

Overview

The contactor assemblies are suitable for use in any climate. They are finger-safe according to EN 50274.

3TE contactor assemblies are available as complete units and components for customer assembly.

The complete unit combinations are optionally supplied without a main conducting path connection between the line contactor and the delta contactor.

Motor protection

3TE68 contactor assemblies are supplied without overload protection. Overload relays or thermistor motor protection trip units must be ordered separately.

The overload relay can be either mounted onto the line contactor or separately fitted. It must be set to 0.58 times the rated motor current.

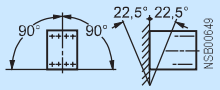
Function

Wye-delta starting can only be used either if the motor normally operates in a Δ connection or starts softly or if the load torque during Y starting is low and does not increase sharply. On the Y step the motors can carry approximately 50 % (class KL 16) or 30 % (class KL 10) of their rated torque; The starting torque is approximately 1/3 of that during direct on-line starting. The starting current is approximately 2 to 2.7 times the rated motor current.

The changeover from Y to Δ must not be effected until the motor has run up to rated speed. Drives which require this changeover to be performed earlier are unsuitable for wye-delta starting.

The ratings given in the selection and ordering data are only applicable to motors with a starting current ratio of $I_A \leq 8.4 \times I_N$ and using a 3RP15 74 wye-delta time relay with a dead interval of approximately 50 ms on reversing.

Technical specifications

Starters	Type			3TE68
General data				
Permissible mounting position, assembly note[1] The contactors are designed for operation on a vertical mounting surface.				
Mechanical endurance			Operating cycles	3 million
Type of individual contactors	K1 Line contactor K3 delta contactor K2 wye contactor		Type Type Type	3TF68 3TF68 3RT10 75
Unassigned auxiliary contacts of the contactors				[2]
Current-carrying capacity with reversing time up to 10 s				
Rated operational current I_e	up to 690 V		A	1 090
Rated output power for induction motors with 50 Hz	at 230 V 400 V 500 V 690 V		kW kW kW kW	355 612 800 1 046
Operating frequency with overload relay			h^{-1}	3
Current-carrying capacity with reversing time up to 15 s				
Rated operational current I_e	up to 500 V 690 V		A A	923 883
Rated output power for induction motors with 50 Hz	at 230 V 400 V 500 V 690 V		kW kW kW kW	295 515 677 885
Operating frequency with overload relay			h^{-1}	2
Current-carrying capacity with reversing time up to 20 s				
Rated operational current I_e	up to 500 V 690 V		A A	800 765
Rated output power for induction motors with 50 Hz	at 230 V 400 V 500 V 690 V		kW kW kW kW	244 444 590 770
Operating frequency with overload relay			h^{-1}	2
Short-circuit protection				
Main circuit Fuse links gL/gG NH 3NA, DIAZED 5SB, NEOZED 5SE				
- Acc. to IEC 60947-4-1/EN 60947-4-1	Type of coordination "1" Type of coordination "2"		A A	1000 500[3]
Auxiliary circuit				
Fuse links gL/gG (weld-free protection at $I_k \geq 1$ kA) DIAZED 5SB, NEOZED 5SE			A	10
or miniature circuit-breakers with C-characteristic (I_k < 400 A)				

1) If the contactors are mounted at a 90° angle (conducting paths horizontally one above the other), the following reductions apply: Operating frequency: to 80 % of the standard values.

2) See circuit diagrams of the control circuits.

3) The maximum rated motor current must not be exceeded.

3TE6 contactor assemblies for wye-delta starting, 630 kW

Short-circuit protection with fuses for motor feeders with short-circuit currents up to 50 kA and 690 V

Contactor assembly	Rated motor current	Overload relay	Setting range (the overload relays must be set to 0.58 times the rated motor current)	Permissible short-circuit fuses for starters, comprising contactor assemblies and overload relays. Single or double infeed[1] Fuse links						
				LV HRC Type 3NA, DIAZED Type 5SB, NEOZED Type 5SE Type of coordination		LV HRC 3ND, aM operational class Type of coordination "2"	Siemens Canada, HRC fuses, Type II	UL-listed fuses CLASS L	British Standard Fuses BS88 Type of coordination	
				"1"	"2"				"1"	"2"
Type	A	Type	A	A	A	A	A	A	A	A
3TE68	277 ... 1090	3RB20 66	160 ... 630	1000	500	630	1000	1200	1000	500

For short-circuit protection with overload relays see Protection Equipment: Overload Relays -> 3RB2 Solid-State Overload Relays.
Use double infeed for higher rated motor currents (see circuit diagram).

1) The maximum rated motor current must not be exceeded.

Overview

AC and DC operation (size S3)

UC operation (AC/DC) (sizes S6 to S12)

IEC 60947, EN 60947 (VDE 0660)

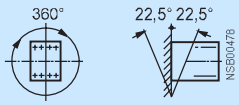
The contactors are suitable for use in any climate. They are finger-safe according to EN 50274.

3RT14 contactors are used for switching resistive loads (AC-1) or as contactors, for example, for variable-speed drives that normally only have to carry the current.

The accessories for the 3RT10 contactors can also be used here.

For more detailed descriptions about the sizes S6 to S12, see 3RT10 Contactors, 3-pole, 3 ... 250 kW.

Technical specifications

Contactor	Type Size		**3RT14 46** **S3**
General data			
Permissible mounting position The contactors are designed for operation on a vertical mounting surface.	AC and DC operation		 For DC operation and 22.5 °C inclination towards the front, operating range 0.85 ... 1.1 x U_s
Upright mounting position:	AC operation		 Special design required.
	DC operation		--
Mechanical endurance		Operating cycles	10 million
Electrical endurance in operating cycles **Utilization category AC-1 at I_e**		Operating cycles	0.5 million
Rated insulation voltage U_i (pollution degree 3)		V	1 000
Rated impulse withstand voltage U_{imp}		kV	6
Safe isolation Between the coil and the contacts acc. to EN 60947-1, Appendix N		V	690
Mirror contacts A mirror contact is an auxiliary NC contact that cannot be closed simultaneously with a NO main contact.	Removable auxiliary switch block Permanently fitted auxiliary switch block		Yes. Acc. to EN 60947-4-1, Appendix F Acc. to Swiss regulations (SUVA) on request
Permissible ambient temperature	During operation During storage	°C °C	-25 ... +60 -55 ... +80
Degree of protection acc. to EN 60947-1, Appendix C			IP20 (terminal enclosure IP00), AC coil assembly IP40, DC coil assembly IP30
Touch protection acc. to EN 50274			Finger-safe
Shock resistance			
Rectangular pulse	AC and DC operation	g/ms	6.8/5 and 4/10
Sine pulse	AC and DC operation	g/ms	10.6/5 and 6.2/10
Conductor cross-sections			1)
Short-circuit protection for contactors without overload relays			
Main circuit			
Fuse links, gL/gG operational class, LV HRC, 3NA	Type of coordination "1"	A	250
Fuse links, gR operational class, SITOR 3NE	Type of coordination "2"	A	250
Auxiliary circuit			
Fuse links gL/gG (weld-free protection at I_k ≥1 kA) DIAZED 5SB, NEOZED 5SE or miniature circuit-breakers with C-characteristic (I_k < 400 A)		A A	10 10

1) See conductor cross-sections on page 3/94.

3RT14 Contactors for Switching Resistive Loads (AC-1)

3-pole, 140 ... 690 A

Contactor	Type Size		**3RT14 46** **S3**
Control			
Coil operating range		AC/DC	0.8 ... 1.1 x U_S
Power consumption of the magnetic coils (when coil is cold and 1.0 x U_S)			
Standard version, AC operation, 50 Hz	• Closing • p.f.	VA	270 0.68
	• Closed • p.f.	VA	22 0.27
Standard version, AC operation, 50/60 Hz	• Closing • p.f.	VA	298/274 0.7/0.62
	• Closed • p.f.	VA	27/20 0.29/0.31
For USA and Canada, AC operation, 50 Hz	• Closing • p.f.	VA	270 0.68
	• Closed • p.f.	VA	22 0.27
For USA and Canada, AC operation, 60 Hz	• Closing • p.f.	VA	300 0.52
	• Closed • p.f.	VA	21 0.29
DC operation	Closing = Closed	W	15
Operating times for 0.8 ... 1.1 x U_S[1] Total break time = Opening delay + Arcing time			
• AC operation	Closing delay Opening delay	ms ms	17 ... 90 10 ... 25
• DC operation	Closing delay Opening delay	ms ms	90 ... 230 14 ... 20
• Arcing time		ms	10 ... 15
Operating times for 1.0 x U_S[1]			
• AC operation	Closing delay Opening delay	ms ms	18 ... 30 11 ... 23
• DC operation	Closing delay Opening delay	ms ms	100 ... 120 16 ... 20

1) The opening delay of the NO contact and the closing delay of the NC contact are increased if the contactor coils are attenuated against voltage peaks (varistor +2 ms up to 5 ms, diode assembly: 2 to 6 times).

Contactor	Type / Size			3RT14 46 S3
Main circuit				
AC capacity				
Utilization category AC-1, switching resistive loads				
Rated operational currents I_e	at 40 °C up to 690 V	A		140
	at 60 °C up to 690 V	A		130
	at 1000 V	A		60
Ratings of slipring or squirrel-cage AC loads p.f. = 0.95 (at 60 °C)	at 230 V	kW		50
	400 V	kW		86
	500 V	kW		107
	690 V	kW		148
	1000 V	kW		98
Minimum conductor cross-section for loads with I_e	at 40 °C	mm^2		50
	at 60 °C	mm^2		50
Utilization category AC-2 and AC-3 With an electrical endurance of 1.3 million operating cycles				
Rated operational current I_e	up to 690 V	A		44
Rated output power of slipring or squirrel-cage motors at 50 Hz and 60 Hz (at 60 °C)	at 230 V	kW		12.7
	400 V	kW		22
	500 V	kW		29.9
	690 V	kW		38.2
Power loss per conducting path	at I_e/AC-1	W		12.5
Load rating with DC				
Utilization category DC-1, switching resistive loads (L/R ≤ 1 ms)				
Rated operational current I_e (at 60 °C)				
• 1 current path	up to 24 V	A		130
	60 V	A		80
	110 V	A		12
	220 V	A		2.5
	440 V	A		0.8
	600 V	A		0.48
• 2 current paths in series	up to 24 V	A		130
	60 V	A		130
	110 V	A		130
	220 V	A		13
	440 V	A		2.4
	600 V	A		1.3
• 3 current paths in series	up to 24 V	A		130
	60 V	A		130
	110 V	A		130
	220 V	A		130
	440 V	A		6
	600 V	A		3.4
Utilization category DC-3/DC-5 Shunt-wound and series-wound motors (L/R ≤ 15 ms)				
Rated operational current I_e (at 60 °C)				
• 1 current path	up to 24 V	A		6
	60 V	A		3
	110 V	A		1.25
	220 V	A		0.35
	440 V	A		0.15
	600 V	A		0.1
• 2 current paths in series	up to 24 V	A		130
	60 V	A		130
	110 V	A		130
	220 V	A		1.75
	440 V	A		0.42
	600 V	A		0.27
• 3 current paths in series	up to 24 V	A		130
	60 V	A		130
	110 V	A		130
	220 V	A		4
	440 V	A		0.8
	600 V	A		0.45
Operating frequency				
Operating frequency *z* in operating cycles/hour				
Contactors without overload relays	No-load operating frequency AC	1/h		5000
	No-load operating frequency DC	1/h		1000
Rated operation	acc. to AC-1 (AC/DC)	1/h		650
	acc. to AC-3 (AC/DC)	1/h		1000
Dependence of the operating frequency z' on the operational current I' and operational voltage U': $z' = z \cdot (I_e/I') \cdot (400\ V/U')^{1.5} \cdot 1/h$				

3RT14 Contactors for Switching Resistive Loads (AC-1)

3-pole, 140 ... 690 A

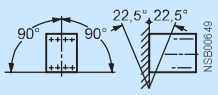
Contactor	Type Size		3RT14 46 S3
Conductor cross-sections			
Screw terminals (1 or 2 conductors connectable) **Front clamping point connected** 	**Main conductors:** With box terminal		
	• Finely stranded with end sleeve • Finely stranded without end sleeve	mm^2 mm^2	2.5 ... 50 4 ... 50
	• Solid • Stranded	mm^2 mm^2	2.5 ... 16 4 ... 70
	• Ribbon cable conductors (number x width x circumference)	mm	6 x 9 x 0.8
	• AWG conductors, solid or stranded	AWG	10 ... 2/0
Rear clamping point connected 	• Finely stranded with end sleeve • Finely stranded without end sleeve	mm^2 mm^2	2.5 ... 50 10 ... 50
	• Solid • Stranded	mm^2 mm^2	2.5 ... 16 10 ... 70
	• Ribbon cable conductors (number x width x circumference)	mm	6 x 9 x 0.8
	• AWG conductors, solid or stranded	AWG	10 ... 2/0
Both clamping points connected 	• Finely stranded with end sleeve • Finely stranded without end sleeve	mm^2 mm^2	Max. 2 x 35 Max. 2 x 35
	• Solid • Stranded	mm^2 mm^2	Max. 2 x 16 Max. 2 x 50
	• Ribbon cable conductors (number x width x circumference)	mm	2 x (6 x 9 x 0.8)
	• AWG conductors, solid or stranded	AWG	2 x (10 ... 1/0)
	• Terminal screws - Tightening torque	 Nm	M6 (hexagon socket, A/F 4) 4 ... 6 (36 ... 53 lb.in)
Connection for drilled copper bars	Max. width[1]	mm	10
	Main conductor: Without box terminal with cable lugs[2]		
	• Finely stranded with cable lug • Stranded with cable lug	mm^2 mm^2	10 ... 50[3] 10 ... 70[3]
	• AWG conductors, solid or stranded	AWG	7 ... 1/0
	Auxiliary conductors:		
	• Solid	mm^2	2 x (0.5 ... 1.5); 2 x (0.75 ... 2.5) acc. to IEC 60947; max. 2 x (0.75 ... 4)
	• Finely stranded with end sleeve	mm^2	2 x (0.5 ... 1.5); 2 x (0.75 ... 2.5)
	• AWG conductors, solid or stranded	AWG	2 x (20 ... 16); 2 x (18 ... 14); 1 x 12
	• Terminal screws - Tightening torque	 Nm	M3 0.8 ... 1.2 (7 ... 10.3 lb.in)

1) If bars larger than 12 x 10 mm are connected, a 3RT19 46-4EA1 terminal cover is needed to comply with the phase clearance.

2) When connecting rails which are larger than 25 mm^2, the 3RT19 46-4EA1 cover must be used to keep the phase clearance.

3) Only with crimped cable lugs according to DIN 46234. Cable lug max. 20 mm wide.

Technical specifications

Contactor / Type / Size			3RT14 56 S6	3RT14 66 S10	3RT14 76 S12
General data					
Permissible mounting position The contactors are designed for operation on a vertical mounting surface.					
Mechanical endurance		Operating cycles	10 million		
Electrical endurance Utilization category AC-1 at I_e		Operating cycles	0.5 million		
Rated insulation voltage U_i (pollution degree 3)		V	1000		
Rated impulse withstand voltage U_{imp}		kV	8		
Safe isolation between the coil and the auxiliary contacts and contacts acc. to EN 60947-1, Appendix N		V	690		
Mirror contacts A mirror contact is an auxiliary NC contact that cannot be closed simultaneously with a NO main contact.			Yes. Acc. to EN 60947-4-1, Appendix F		
Permissible ambient temperature	During operation During storage	°C °C	-25 ... +60/+55 with AS-Interface -55 ... +80		
Degree of protection acc. to EN 60947-1, Appendix C			IP00/open, coil assembly IP20		
Touch protection acc. to EN 50274			Finger-safe with cover		
Shock resistance	Rectangular pulse Sine pulse	g/ms g/ms	8.5/5 and 4.2/10 13.4/5 and 6.5/10		
Conductor cross-sections			1)		
Electromagnetic compatibility (EMC)			2)		
Short-circuit protection					
Main circuit					
Fuse links gL/gG NH 3NA	Type of coordination "1"	A	355	500	800
Fuse links gR, SITOR 3NE	Type of coordination "2"	A	350	500	710
Auxiliary circuit					
Fuse links gL/gG (weld-free protection at $I_k \geq 1$ kA) DIAZED 5SB, NEOZED 5SE		A	10		
or miniature circuit-breakers with C-characteristic (short-circuit current $I_k < 400$ A)					

1) See conductor cross-sections on pages 3/98, 3/99.

2) See Electromagnetic Compatibility (EMC) on page 3/9.

3RT14 Contactors for Switching Resistive Loads (AC-1)

3-pole, 140 ... 690 A

Contactor	Type Size		3RT14 56 S6	3RT14 66 S10	3RT14 76 S12
Control					
Operating range of the solenoid	AC/DC (UC)		0.8 x $U_{s\,min}$ ... 1.1 x $U_{s\,max}$		
Power consumption of the solenoid (when coil is cool and rated range $U_{s\,min}$ ... $U_{s\,max}$)					
• Conventional operating mechanism					
- AC operation	Closing at $U_{s\,min}$	VA/p.f.	250/0.9	490/0.9	700/0.9
	Closing at $U_{s\,max}$	VA/p.f.	300/0.9	590/0.9	830/0.9
	Closed at $U_{s\,min}$	VA/p.f.	4.8/0.8	5.6/0.9	7.6/0.9
	Closed at $U_{s\,max}$	VA/p.f.	5.8/0.8	6.7/0.9	9.2/0.9
- DC operation	Closing at $U_{s\,min}$	W	300	540	770
	Closing at $U_{s\,max}$	W	360	650	920
	Closed at $U_{s\,min}$	W	4.3	6.1	8.5
	Closed at $U_{s\,max}$	W	5.2	7.4	10
• Solid-state operating mechanism					
- AC operation	Closing at $U_{s\,min}$	VA/p.f.	190/0.8	400/0.8	560/0.8
	Closing at $U_{s\,max}$	VA/p.f.	28 /0.8	530/0.8	750/0.8
	Closed at $U_{s\,min}$	VA/p.f.	3.5/0.5	4/0.5	5.4/0.8
	Closed at $U_{s\,max}$	VA/p.f.	4/0.4	5/0.4	7/0.8
- DC operation	Closing at $U_{s\,min}$	W	250	440	600
	Closing at $U_{s\,max}$	W	320	580	800
	Closed at $U_{s\,min}$	W	2.3	3.2	4
	Closed at $U_{s\,max}$	W	2.8	3.8	5
PLC control input (EN 61131-2/type 2)			24 V DC/ ≤ 30 mA power consumption, (operating range DC 17 ... 30 V)		
Operating times (Total break-time = Opening delay + Arcing time)					
• Conventional operating mechanism					
- with 0.8 x $U_{s\,min}$ ... 1.1 x $U_{s\,max}$	Closing delay	ms	20 ... 95	30 ... 95	45 ... 100
	Opening delay	ms	40 ... 60	40 ... 80	60 ... 100
- for $U_{s\,min}$ ... $U_{s\,max}$	Closing delay	ms	25 ... 50	35 ... 50	50 ... 70
	Opening delay	ms	40 ... 60	50 ... 80	70 ... 100
• Solid-state operating mechanism, actuated via A1/A2					
- with 0.8 x $U_{s\,min}$ ... 1.1 x $U_{s\,max}$	Closing delay	ms	95 ... 135	105 ... 145	120 ... 150
	Opening delay	ms	80 ... 90	80 ... 200	80 ... 100
- for $U_{s\,min}$ ... $U_{s\,max}$	Closing delay	ms	100 ... 120	110 ... 130	125 ... 150
	Opening delay	ms	80 ... 90	80 ... 100	80 ... 100
• Solid-state operating mechanism, actuated via PLC input					
- with 0.8 x $U_{s\,min}$ ... 1.1 x $U_{s\,max}$	Closing delay	ms	35 ... 75	45 ... 80	60 ... 90
	Opening delay	ms	80 ... 90	80 ... 100	80 ... 100
- for $U_{s\,min}$ ... $U_{s\,max}$	Closing delay	ms	40 ... 60	50 ... 65	65 ... 80
	Opening delay	ms	80 ... 90	80 ... 100	80 ... 100
• Arcing time		ms	10 ... 15	10 ... 15	10 ... 15
Main circuit					
AC capacity					
Utilization category AC-1, switching resistive loads					
Rated operational currents I_e	at 40 °C up to 690 V	A	275	400	690
	at 60 °C up to 690 V	A	250	380	650[1]
	at 1000 V	A	100	150	250
Rated output power for AC loads[2] p.f.= 0.95 (for 60 °C)	at 230 V	kW	95	145	245
	400 V	kW	165	250	430
	500 V	kW	205	315	535
	690 V	kW	285	430	740
	1000 V	kW	165	247	410
Minimum conductor cross-section for loads with I_e	at 40 °C	mm²	2 x 70	240	2 x 240
	at 60 °C	mm²	120	240	2 x 240
Power loss per conducting path	at I_e/AC-1	W	20	27	55
Utilization category AC-2 and AC-3 for an electrical endurance of 1.3 million operating cycles					
Rated operational current I_e	up to 690 V	A	97	138	170
Rated output power of slipring or squirrel-cage motors at 50 Hz and 60 Hz (at 60 °C)	at 230 V	kW	30	37	55
	400 V	kW	55	75	90
	500 V	kW	55	90	110
	690 V	kW	90	132	160

1) 600 A for 3RT14 76-N contactor.

2) Industrial furnaces and electric heaters with resistance heating, etc. (increased power consumption on heating up taken into account).

Contactor	Type Size			3RT14 56 S6	3RT14 66 S10	3RT14 76 S12
Main circuit						
Load rating with DC						
Utilization category DC-1, switching resistive loads (L/R ≤ 1 ms) **Rated operational current** I_e (at 60 °C)						
• 1 current path		up to 24 V	A	250	380	500
		60 V	A	250	380	500
		110 V	A	18	33	33
		220 V	A	3.4	3.8	3.8
		440 V	A	0.8	0.9	0.9
		600 V	A	0.5	0.6	0.6
• 2 current paths in series		up to 24 V	A	250	380	500
		60 V	A	250	380	500
		110 V	A	250	380	500
		220 V	A	20	380	500
		440 V	A	3.2	4	4
		600 V	A	1.6	2	2
• 3 current paths in series		up to 24 V	A	250	380	500
		60 V	A	250	380	500
		110 V	A	250	380	500
		220 V	A	250	380	500
		440 V	A	11.5	11	11
		600 V	A	4	5.2	5.2
Utilization category DC-3/DC-5 **Shunt-wound and series-wound motors (L/R ≤ 15 ms)** **Rated operational current** I_e (at 60 °C)						
• 1 current path		up to 24 V	A	250	380	500
		60 V	A	7.5	11	11
		110 V	A	2.5	3	3
		220 V	A	0.6	0.6	0.6
		440 V	A	0.17	0.18	0.18
		600 V	A	0.12	0.125	0.125
• 2 current paths in series		up to 24 V	A	250	380	500
		60 V	A	250	380	500
		110 V	A	250	380	500
		220 V	A	2.5	2.5	2.5
		440 V	A	0.65	0.65	0.65
		600 V	A	0.37	0.37	0.37
• 3 current paths in series		up to 24 V	A	250	380	500
		60 V	A	250	380	500
		110 V	A	250	380	500
		220 V	A	250	380	500
		440 V	A	1.4	1.4	1.4
		600 V	A	0.75	0.75	0.75
Operating frequency						
Operating frequency *z* in operating cycles/hour						
Contactors without overload relays	No-load operating frequency		h^{-1}	2000		
	AC-1		h^{-1}	600		
	AC-3		h^{-1}	1000		
Dependence of the operating frequency z' on the operational current I' and operational voltage U': $z' = z \cdot (I_e/I') \cdot (400\ V/U')^{1.5} \cdot 1/h$						

3RT14 Contactors for Switching Resistive Loads (AC-1)

3-pole, 140 ... 690 A

Contactor	Type Size		**3RT14 56** **S6**
Conductor cross-sections			
Screw terminals	**Main conductors:** With 3RT19 55-4G box terminal		
Front or rear clamping point connected			
	• Finely stranded with end sleeve • Finely stranded without end sleeve	mm^2 mm^2	16 ... 70 16 ... 70
	• Stranded	mm^2	16 ... 70
	• Ribbon cable conductors (number x width x circumference)	mm	3 x 9 x 0.8 ... 6 x 15.5 x 0.8
	• AWG conductors, solid or stranded	AWG	6 ... 2/0
Both clamping points connected			
	• Finely stranded with end sleeves, max. • Finely stranded without end connector sleeve	mm^2 mm^2	1 x 50, 1 x 70 1 x 50, 1 x 70
	• Stranded (max.)	mm^2	2 x 70
	• Ribbon cable conductors (number x width x circumference), max.	mm	2 x (6 x 15.5 x 0.8)
	• AWG conductors, solid or stranded, max.	AWG	2 x 1/0
Front or rear clamping point connected	**Main conductors**: With 3RT19 56-4G box terminal		
	• Finely stranded with end sleeve • Finely stranded without end sleeve	mm^2 mm^2	16 ... 120 16 ... 120
	• Stranded	mm^2	16 ... 120
	• Ribbon cable conductors (number x width x circumference)	mm	3 x 9 x 0.8 ... 10 x 15.5 x 0.8
	• AWG conductors, solid or stranded	AWG	6 ... 250 kcmil
Both clamping points connected			
	• Finely stranded with end sleeves, max. • Finely stranded without end connector sleeve	mm^2 mm^2	1 x 95, 1 x 120 1 x 95, 1 x 120
	• Stranded (max.)	mm^2	2 x 120
	• Ribbon cable conductors (number x width x circumference), max.	mm	2 x (10 x 15.5 x 0.8)
	• AWG conductors, solid or stranded, max. • Terminal screws - Tightening torque	AWG Nm	2 x 3/0 M10 (hexagon socket, A/F 4) 10 ... 12 (90 ... 110 lb.in)
Screw terminals	**Main conductors:** Without box terminal/rail connection[1]		
	• Finely stranded with cable lug • Stranded with cable lug		16 ... 95 25 ... 120
	• AWG conductors, solid or stranded		4 ... 250 kcmil
	• Connecting bar (max. width)		17
	• Terminal screw - Tightening torque	 Nm	M8 x 25 (A/F 13) 10 ... 14 (90 ... 110 lb.in)
	Auxiliary conductors:		
	• Conductor cross-section - Solid - Finely stranded with end sleeve - Solid or stranded AWG (2 x)		 2 x (0.5 ... 1.5); 2 x (0.75 ... 2.5) acc. to IEC 60947; max. 2 x (0.75 ... 4) 2 x (0.5 ... 1.5); 2 x (0.75 ... 2.5) 2 x (18 ... 14)
	• Terminal screw - Tightening torque	 Nm	M3 (PZ 2) 0.8 ... 1.2 (7 ... 10.3 lb.in)

1) When connection cable lugs to DIN 46235, use 3RT19 56-4EA1 terminal cover for conductor cross-sections from 95 mm^2 to ensure phase spacing.

3RT14 Contactors for Switching Resistive Loads (AC-1)

3-pole, 140 ... 690 A

Contactor	Type Size		**3RT14 66** **S10**	**3RT14 76** **S12**
Conductor cross-sections				
Screw terminals (1 or 2 conductors connectable) **Front clamping point connected** 	**Main conductors:** With 3RT19 66-4G box terminal			
	• Finely stranded with end sleeve • Finely stranded without end sleeve	mm² mm²	70 ... 240 70 ... 240	
	• Stranded	mm²	95 ... 300	
	• AWG conductors, solid or stranded	AWG	3/0 ... 600 kcmil	
	• Ribbon cable conductors (number x width x circumference)	mm	Min. 6 x 9 x 0.8, max. 20 x 24 x 0.5	
Rear clamping point connected 	• Finely stranded with end sleeve • Finely stranded without end sleeve	mm² mm²	120 ... 185 120 ... 185	
	• Stranded	mm²	120 ... 240	
	• AWG conductors, solid or stranded	AWG	250 ... 500 kcmil	
	• Ribbon cable conductors (number x width x circumference)	mm	Min. 6 x 9 x 0.8, max. 20 x 24 x 0.5	
Both clamping points connected 	• Finely stranded with end sleeve • Finely stranded without end sleeve	mm² mm²	Min. 2 x 50, max. 2 x 185 Min. 2 x 50, max. 2 x 185	
	• Stranded	mm²	Min. 2 x 70, max. 2 x 240	
	• AWG conductors, solid or stranded	AWG	Min. 2 x 2/0, max. 2 x 500 kcmil	
	• Ribbon cable conductors (number x width x circumference)	mm	Max. 2 x (20 x 24 x 0.5)	
	• Terminal screws - Tightening torque	 Nm	M12 (hexagon socket, A/F 5) 20 ... 22 (180 ... 195 lb.in)	
Screw terminals	**Main conductors:** Without box terminal/rail connection[1)]			
	• Finely stranded with cable lug • Stranded with cable lug	mm² mm²	50 ... 240 70 ... 240	
	• AWG conductors, solid or stranded	AWG	2/0 ... 500 kcmil	
	• Connecting bar (max. width)	mm	25	
	• Terminal screws - Tightening torque	 Nm	M10 x 30 (A/F 17) 14 ... 24 (124 ... 210 lb.in)	
	Auxiliary conductors:			
	• Solid	mm²	2 x (0.5 ... 1.5); 2 x (0.75 ... 2.5) acc. to IEC 60947; max. 2 x (0.75 ... 4)	
	• Finely stranded with end sleeve	mm²	2 x (0.5 ... 1.5); 2 x (0.75 ... 2.5)	
	• AWG conductors, solid or stranded	AWG	2 x (18 ... 14)	
	• Terminal screws - Tightening torque	 Nm	M3 (PZ 3) 0.8 ... 1.2 (7 ... 10.3 lb.in)	

1) When connecting cable lugs to DIN 46234, the 3RT19 66-4EA1 terminal cover must be used for conductor cross-sections of 240 mm² and more as well as DIN 46235 for conductor cross-sections of 185 mm² and more to keep the phase clearance.

3RT13 Contactors for Switching Resistive Loads (AC-1)

4-pole, 4 NO, 18 ... 140 A

Overview

AC and DC operation

EN 60947-4-1 (VDE 0660, Part 102)

The contactors are suitable for use in any climate. They are finger-safe according to EN 50274.

The accessories for the 3-pole SIRIUS contactors can also be used for the 4-pole versions.

Function

- Switching resistive loads
- Isolating systems with ungrounded or poorly grounded neutral conductors
- System transfers when alternative AC power supplies are used
- As contactors, e.g. for variable-speed drives which only have to carry current and not switch

Integration

Mountable auxiliary contacts

Size S00

4 auxiliary contacts (according to EN 50005)

Size S0

Maximum 2 auxiliary contacts (either laterally mounted or snapped onto the top).

Size S2 to S3

Max. 4 auxiliary contacts (either laterally mounted or snapped onto the top)

Contactor assembly with mechanical interlock

The 4-pole 3RT13 contactors with 4 NO contacts as the main contacts are suitable for making contactor assemblies with a mechanical interlock, e.g. for system transfers.

Size S00

Contactor assemblies can be constructed from two 3RT13 1. contactors in conjunction with mechanical interlocks and two connecting clips (Order No.: 3RA19 12-2H, package with 10 interlock elements and 20 clips for 10 assemblies).

Size S0

When constructing 4-pole contactor assemblies from two 3RT13 2. contactors, the fourth pole of the left contactor must always be moved to the left side. The contactor assembly can then be made easily with the aid of the 3RA19 24-1A mechanical interlock fitted onto the front and the 3RA19 22-2C mechanical connectors. The laterally mountable 3RA19 24-2B mechanical interlock can be used if the contactor assembly is mounted on a base plate.

Sizes S2 and S3

Contactor assemblies can be constructed from two 3RT13 3. or two 3RT13 4. contactors in conjunction with the laterally mountable 3RA19 24-2B mechanical interlock and the 3RA19 .2-2G mechanical connectors. The mechanical interlock for fitting onto the front cannot be used for size S2 and S3 contactors.

Technical specifications

Contactor	Type Size		3RT13 16 S00	3RT13 17 S00	3RT13 25 S0	3RT13 26 S0	3RT13 36 S2	3RT13 44 S3	3RT13 46 S3
General data									
Permissible mounting position[1]									
Mechanical endurance		Oper-ating cycles	30 million		10 million				
Electrical endurance at I_e/AC-1		Oper-ating cycles	Approx. 0.5 million						
Rated insulation voltage U_i (pollution degree 3)		V	690						
Permissible ambient temperature	During operation During storage	°C °C	-25 ... +60 -55 ... +80						
Degree of protection Acc. to EN 60947-1, Appendix C	Device Connection range		IP20				IP20 IP00		
Touch protection acc. to EN 50274			Finger-safe						
Short-circuit protection of contactors without overload relays									
Main circuit Fuse links, gL/gG operational class NH, 3NA, DIAZED, 5SB, NEOZED, 5SE	Type of coordination "1"[1] Type of coordination "2"[1]	A A	35 20		63 25 /35		160 63	250 125	250 160
- Acc. to IEC 60947-4-1/ EN 60947-4-1	Weld-free	A	10		16		50	63	100
Control									
Coil operating range									
	AC at 50 Hz AC at 60 Hz		0.8 ... 1.1 x U_s 0.85 ...1.1 x U_s						
	DC at 50 °C DC at 60 °C AC/DC		0.8 ... 1.1 x U_s 0.85 ... 1.1 x U_s		0.8 ... 1.1 x U_s				
Power consumption of the magnetic coils (when coil is cold and 1.0 x U_s)									
AC operation, 50/Hz	• Closing • p.f.	VA VA			61 0.82		145 0.79	270 0.68	
	• Closed • p.f.	VA VA			7.8 0.24		12.5 0.36	22 0.27	
AC operation, 50/60 Hz	• Closing • p.f.	VA	26.5/24.3 0.79/0.75		64/63 0.82/0.74		170/155 0.76/0.72	298/274 0.72/0.62	
	• Closed • p.f.	VA	4.4/3.4 0.27/0.27		8.4/6.8 0.24/0.28		15/11.8 0.35/0.38	27/20 0.29/0.31	
DC operation	• Closing = Closed	W	3.3		5.6		13.3	15	
Operating times for 0.8 ... 1.1 x U_s[2] Total break time = Opening delay + Arcing time									
• DC operation	Closing delay Opening delay	ms ms	25 ... 100 7 ... 10		30 ... 90 13 ... 40		50 ... 110 15 ... 30	110 ... 200 14 ... 20	
• AC operation	Closing delay Opening delay	ms ms	8 ... 35 4 ... 30		6 ... 30 13 ... 25		4 ... 35 10 ... 30	20 ... 50 10 ... 25	
• Arcing time		ms	10 ... 15		10 ... 15		10 ... 15	10 ... 15	
Main circuit									
AC capacity									
Utilization category AC-1, switching resistive loads									
Rated operational currents I_e	at 40 °C up to 690 V at 60 °C up to 690 V	A A	18 16	22 20	35 30	40 35	60 55	110 100	140 120
Rated output power for AC loads with p.f. = 0.95 (at 40 °C)	at 230 V 400 V	kW kW	7 12	8.5 14.5	12.5 22	15 26	23 39	42 72	53 92
Minimum conductor cross-section for loads with I_e	at 40 °C at 60 °C	mm² mm²	2.5 2.5	2.5 2.5	10 10	10 10	16 16	50 50	50 50
Utilization category AC-2 and AC-3									
Rated operational currents I_e	at 60 °C, for 400 V	A	9	12	17	25	26	--	--
Rated output power of slipring or squirrel-cage motors at 50 Hz and 60 Hz	at 230 V 400 V	kW kW	3 4	3 5.5	4 7.5	5.5 11	5.5 11	-- --	-- --

1) In accordance with the corresponding 3-pole 3RT1 contactors.

2) With size S00, DC operation: switching times at 0.85 ... 1.1 x U_s.

3RT13 Contactors for Switching Resistive Loads (AC-1)

4-pole, 4 NO, 18 ... 140 A

Contactor	Type Size			3RT13 16 S00	3RT13 17	3RT13 25 S0	3RT13 26
Main circuit							
Load rating with DC							
Utilization category DC-1, switching resistive loads (L/R ≤ 1 ms)							
Rated operational current I_e (at 40 °C)							
• 1 current path	up to 24 V	A		18	22	35	
	60 V	A		18	22	20	
	110 V	A		2.1	2.1	4.5	
	220 V	A		0.8	0.8	1	
	440 V	A		0.6	0.6	0.4	
• 2 current paths in series	up to 24 V	A		18	22	35	
	60 V	A		18	22	35	
	110 V	A		12	12	35	
	220 V	A		1.6	1.6	5	
	440 V	A		0.8	0.8	1	
• 3 current paths in series	up to 24 V	A		18	22	35	
	60 V	A		18	22	35	
	110 V	A		18	22	35	
	220 V	A		18	22	35	
	440 V	A		1.3	1.3	2.9	
• 4 current paths in series	up to 24 V	A		18	22	35	
	60 V	A		18	22	35	
	110 V	A		18	22	35	
	220 V	A		18	22	35	
	440 V	A		1.3	1.3	2.9	
Utilization category DC-3/DC-5 **Shunt-wound and series-wound motors (L/R ≤ 15 ms)**							
Rated operational current I_e (at 40 °C)							
• 1 current path	up to 24 V	A		18	20	20	
	60 V	A		0.5	0.5	5	
	110 V	A		0.15	0.15	2.5	
	220 V	A		--	--	1	
	440 V	A		--	--	0.09	
• 2 current paths in series	up to 24 V	A		18	20	35	
	60 V	A		5	5	35	
	110 V	A		0.35	0.35	15	
	220 V	A		--	--	3	
	440 V	A		--	--	0.27	
• 3 current paths in series	up to 24 V	A		18	20	35	
	60 V	A		18	20	35	
	110 V	A		18	20	35	
	220 V	A		1.5	1.5	10	
	440 V	A		0.2	0.2	0.6	
• 4 current paths in series	up to 24 V	A		18	20	35	
	60 V	A		18	20	35	
	110 V	A		18	20	35	
	220 V	A		1.5	1.5	35	
	440 V	A		0.2	0.2	0.6	

For more technical specifications, see 3RT10 Contactors from page 3/17 onwards

4-pole, 4 NO, 18 ... 140 A

Contactor	Type Size			3RT13 36 S2	3RT13 44 S3	3RT13 46 S3
Main circuit						
Load rating with DC						
Utilization category DC-1, switching resistive loads (L/R ≤ 1 ms)						
Rated operational current I_e (at 40 °C)						
• 1 current path	up to 24 V	A		50	70	80
	60 V	A		23	23	60
	110 V	A		4.5	4.5	9
	220 V	A		1	1	2
	440 V	A		0.4	0.4	0.6
• 2 current paths in series	up to 24 V	A		50	70	80
	60 V	A		45	70	80
	110 V	A		45	70	80
	220 V	A		5	5	10
	440 V	A		1	1	1.8
• 3 current paths in series	up to 24 V	A		50	70	80
	60 V	A		45	70	80
	110 V	A		45	70	80
	220 V	A		45	70	80
	440 V	A		2.9	2.9	4.5
• 4 current paths in series	up to 24 V	A		50	70	80
	60 V	A		45	70	80
	110 V	A		45	70	80
	220 V	A		45	70	80
	440 V	A		2.9	2.9	4.5
Utilization category DC-3/DC-5 **Shunt-wound and series-wound motors (L/R ≤ 15 ms)** **Rated operational current** I_e (at 40 °C)						
• 1 current path	up to 24 V	A		20	20	20
	60 V	A		6	6	6.5
	110 V	A		2.5	2.5	2.5
	220 V	A		1	1	1
	440 V	A		0.1	0.15	0.15
• 2 current paths in series	up to 24 V	A		45	70	80
	60 V	A		45	70	80
	110 V	A		25	70	80
	220 V	A		5	7	7
	440 V	A		0.27	0.42	0.42
• 3 current paths in series	up to 24 V	A		45	70	80
	60 V	A		45	70	80
	110 V	A		45	70	80
	220 V	A		25	35	35
	440 V	A		0.6	0.8	0.8
• 4 current paths in series	up to 24 V	A		45	70	80
	60 V	A		45	70	80
	110 V	A		45	70	80
	220 V	A		45	70	80
	440 V	A		0.6	0.8	0.8

For more technical specifications, see 3RT10 Contactors from page 3/25 onwards

3TK1 Contactors for Switching Resistive Loads (AC-1)

4-pole, 4 NO, 200 ... 1000 A

Overview

EN 60947-4-1 (VDE 0660 Part 102)

The contactors also comply with the requirements of NFC 63–110 and NFC 20–040.

The contactors are suitable for use in any climate. They are finger-safe according to EN 50274. Terminal covers may have to be fitted onto the connecting bars, depending on the configuration with other devices.

Solenoids for 3TK10 to 3TK13 contactors: as withdrawable coils.

Surge suppression

Control circuit

Solenoids for 3TK1 contactors: can be retrofitted with RC elements.

Function

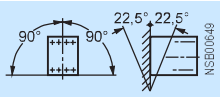
- Isolating systems with ungrounded or poorly grounded neutral conductors
- Switching resistive loads
- System transfers when alternative AC power supplies are used

Technical specifications

Contactor	Type		3TK1
Rated data of the auxiliary contacts			Acc. to IEC 60947-5-1/DIN VDE 0660 Part 200
Rated insulation voltage U_i (pollution degree 3)		V	690
Continuous thermal current I_{th} = Rated operational current I_e/AC-12		A	10
AC load Rated operational current I_e/AC-15/AC-14 For rated operational voltage U_e			
	24 V	A	6
	110 V	A	6
	125 V	A	6
	220 V	A	6
	230 V	A	6
	380 V	A	4
	400 V	A	4
	500 V	A	1
	660 V	A	1
	690 V	A	1
DC load Rated operational current I_e/DC-12 For rated operational voltage U_e			
	24 V	A	--
	60 V	A	--
	110 V	A	--
	125 V	A	--
	220 V	A	--
	440 V	A	--
	600 V	A	--
Rated operational current I_e/DC-13 For rated operational voltage U_e			
	24 V	A	6
	60 V	A	6
	110 V	A	1.8
	125 V	A	--
	220 V	A	0.6
	440 V	A	--
	600 V	A	--
CSA and UL rated data for the auxiliary contacts			
Rated voltage		AC V, max.	600
Switching capacity			A 600, P 600

3TK1 Contactors for Switching Resistive Loads (AC-1)

4-pole, 4 NO, 200 ... 1000 A

Contactor	Type		3TK10	3TK11	3TK12	3TK13	3TK14	3TK15	3TK17
General data									
Permissible mounting position Vertical mounting position also permitted.									
Mechanical endurance	Operating cycles	mill.	10				5		
Electrical endurance For I_e/AC-1 at 55 °C	Operating cycles	mill.	0.8	0.8	0.8	0.4	0.65	0.5	0.4
Rated insulation voltage U_i (pollution degree 3)		V	1 000						
Ambient temperature	During operation During storage	°C °C	-25 ... +55 -50 ... +70						
Degree of protection acc. to EN 60947-1, Appendix C			IP00						
Touch protection acc. to EN 50274			Finger-safe with cover						
Shock resistance	Sine pulse	g/ms	10/15						
Short-circuit protection									
Main circuit Fuse links, gL/gG, NH 3NA, DIAZED 5SB, NEOZED 5SE									
- Acc. to IEC 60947-4-1/ EN 60947-4-1	Type of coordination "1": Type of coordination "2":	A A	250 250		355 315		800 630	1000 850	
Auxiliary circuit (short-circuit current $I_k \geq 1$kA) fuse links, gL/gG, DIAZED 5SB, NEOZED 5SE		A	10						
Control									
Coil operating range			0.85 ... 1.1 x U_s						
Power consumption of the magnetic coils (when coil is cold and 1.0 x U_s)									
50 Hz	Closing p.f.	VA	820 0.4		1100 0.35		3500 0.26		
	Closed p.f.	VA	44 0.34		52 0.35		125 0.4		
60 Hz	Closing p.f.	VA	990 0.35		1200 0.31		4000 0.22		
	Closed p.f.	VA	52 0.35		65 0.34		140 0.43		
Operating times at 1.0 x U_s									
	Closing delay Opening delay	ms ms	20 ... 40 7 ... 15				30 ... 60 10 ... 20		
Arcing time		ms	10				10		
Main circuit									
AC capacity									
Utilization category AC-1, switching resistive loads									
Rated operational currents I_e	at 40 °C up to 690 V at 50 °C up to 690 V	A A	200 180	250 230	300 270	350 310	550 470	800 650	1000 850
Rated output power for AC loads with p.f. = 0.95 (at 40 °C)	at 230 V 400 V 500 V 690 V	kW kW kW kW	76 132 165 227	95 165 206 284	114 197 247 341	132 230 288 397	208 362 452 624	303 527 658 908	378 658 828 1135
Minimum conductor cross-sections for loads with I_e	at 40 °C	mm²	95	150	185	240	185	240	300
Utilization category AC-2 and AC-3									
Rated operational currents I_e	up to 400 V	A	120	145	210	210	400	550	700
Rated output power of squirrel-cage or slipring motors at 50 Hz and 60 Hz	at 230 V 400 V	kW kW	30 55	45 75	75 110	75 110	110 200	160 280	220 370
Short-time current at 40 °C in cold state up to 10 s		A	900	1200	1600	1600	5300	5300	6400
Operating frequency[1]									
Operating frequency z in operating cycles/hour									
Contactors without overload relays	No-load operating frequency AC-1 AC-3	1/h 1/h 1/h	3 600 300 300						

1) Dependence of the operating frequency z' on the operational current I' and operational voltage U' : $z' = z \cdot (I_e/I') \cdot (400\ V/U')^{1.5} \cdot 1/h$.

3TK1 Contactors for Switching Resistive Loads (AC-1)

4-pole, 4 NO, 200 ... 1000 A

Contactor	Type		3TK10	3TK11	3TK12	3TK13	3TK14	3TK15	3TK17
Conductor cross-sections									
Main conductors:									
• Stranded with cable lug		mm^2	2 x 70	2 x 120	2 x 120		2 x 300		
• Solid or stranded	AWG	MCM	2 x 00	2 x 250	2 x 250		2 x 600		
• Connecting bar (max. width)		mm	30	30	33		55		
• Terminal screw			M6	M10	M10		M10		
- Tightening torque		Nm	5	16	16		16		
		lb.in	42	135	135		135		
Auxiliary conductors:									
• Solid		mm^2	2 x (0.5 ... 2.5)						
• Finely stranded with end sleeve		mm^2	2 x (0.5 ... 2.5)						
• Solid or stranded	AWG	MCM	20 ... 14						
- Tightening torque		Nm	1.2 (10 lb.in)						

4-pole, 4 kW

Overview

AC and DC operation

IEC 60947 (VDE 0660).

The contactors are suitable for use in any climate. The contactors with screw terminal are finger-safe according to EN 50274.

The contactors are available in versions with screw terminals, 6.3 mm plug connectors and solder pin connectors for soldering in printed circuit boards.

Design

Auxiliary contacts

Contact reliability

To switch voltages ≤ 110 V and currents ≤ 100 mA the 3TH2 contactor relays should be used as they guarantee a high level of contact reliability.

These auxiliary contacts are suitable for electronic circuits with currents 1 ≥ mA at a voltage of 17 V and higher.

Short circuit protection of the contactors

Short circuit protection of the contactors without overload relay, see Technical Specifications

Version

The 3TK2 contactors with 4 main contacts are available with screw terminals, 6.3 mm x 0.8 mm flat connectors and solder pin connectors.

The contactors with 6.3 mm x 0.8 mm flat connectors are coded can be used in the plug-in socket with solder pin connectors for printed circuit boards.

Technical specifications

3TK20

Endurance of the main contacts

The characteristic curves show the contact endurance of the contactors when switching inductive AC loads (AC-3) depending on the breaking current and rated operational voltage. It is assumed that the operating mechanisms are switched randomly, i.e. not synchronized with the phase angle of the supply system.
The rated operational current I_e complies with utilization category AC-4 (breaking six times the rated operational current) and is intended for a contact endurance of at least 200 000 operating cycles. If a shorter endurance is sufficient, the rated operational current I_e/AC-4 can be increased.
If the contacts are used for mixed operation, i.e. if normal switching (breaking the rated operational current according to utilization category AC-3) in combination with intermittent inching (breaking several times the rated operational current according to utilization category AC-4), the contact endurance can be calculated approximately from the following equation:

$$X = \frac{A}{1 + \frac{C}{100}\left(\frac{A}{B} - 1\right)}$$

Characters in the equation:
X = Contact endurance for mixed operation in operating cycles
A = Contact endurance for normal operation ($I_a = I_e$) in operating cycles
B = Contact endurance for inching (I_a = multiple of I_e) in operating cycles
C = Inching operations as a percentage of total switching operations

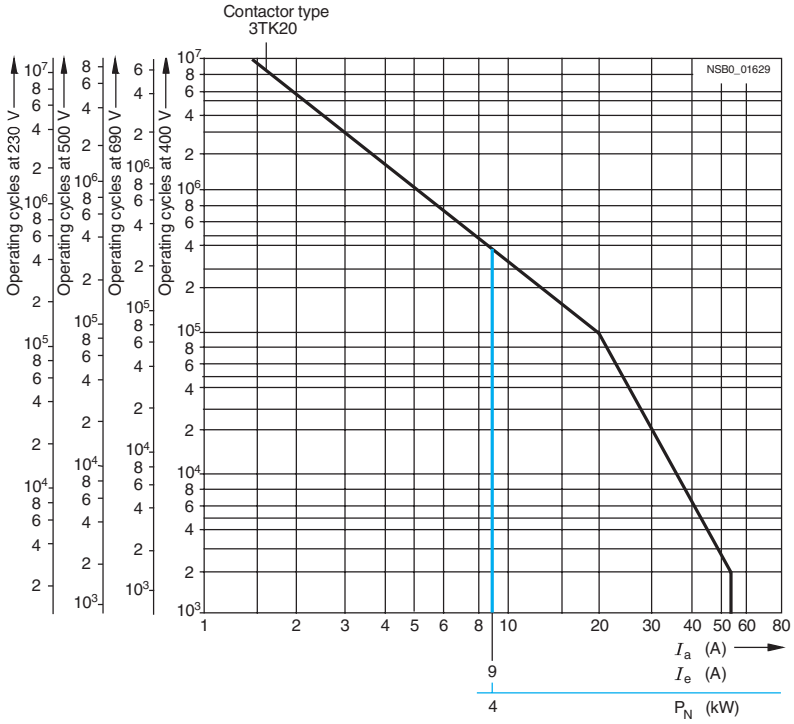


Diagram legend:
P_N = Rated output power for squirrel-cage motors at 400 V
I_a = Breaking current
I_e = Rated operational current

3TK20 Contactors

4-pole, 4 kW

Contactors			
Type			**3TK20**
General data			
Permissible mounting position	AC and DC operation		any
Mechanical endurance	AC operation DC operation Auxiliary contact block	Operating cycles	10 million 30 million 10 million
Rated insulation voltage U_i (pollution degree 3)			
• Screw terminal		V	690
• Flat connector 6.3 mm x 0.8 mm		V	500
• Solder pin connection		V	500
Rated impulse withstand voltage U_{imp} (pollution degree 3)			
• Screw terminal		kV	8
• Flat connector 6.3 mm x 0.8 mm		kV	6
• Solder pin connection		kV	6
Safe isolation between coil and main contacts (acc. to DIN VDE 0106 Part 101 and A1 [draft 02/89])		V	Up to 300
Permissible ambient temperature[1]	During operation During storage	°C °C	-25 ... +55 -55 ... +80
Degree of protection acc. to EN 60947-1 Appendix C			IP00 open IP20 for screw terminal IP40 coil assembly
Touch protection acc. to EN 50274			Finger-safe for screw terminal
Resistance to shock			
Rectangular pulse	AC operation DC operation	g/ms g/ms	8.3/5 and 5.2/10 11.3/5 and 9.2/10
Sine pulse	AC operation DC operation	g/ms g/ms	13/5 and 8/10 17.4/5 and 12.9/10
Conductor cross-sections			[2]
Short-circuit protection for contactors without overload relays			
Main circuit[3]			
• Fuse-links gL/gG NH 3NA, DIAZED 5SB, NEOZED 5SE			
- Acc. to IEC 60947-4/ DIN VDE 0660, Part 2	Type of coordination "1" Type of coordination "2"[4] Weld-free	A A A	25 10 10
• Miniature circuit-breaker with C-characteristic		A	10
Auxiliary circuit Short-circuit current $I_k \geq 1$ kA			
• Fuse-links gL/gG DIAZED 5SB, NEOZED 5SE		A	6

1) Applies to 50/60 Hz coil:
At 50 Hz, 1.1 x U_S, side-by-side mounting and 100% ON period the max. ambient temperature is +40 °C.

2) See page 3/112.

3) According to excerpt from IEC 60947-4/DIN VDE 0660 Part 102
Type of coordination "1":
Destruction of the contactor and the overload relay is permissible. The contactor and/or overload relay can be replaced if necessary.
Type of coordination "2":
The overload relay must not suffer any damage. Contact welding on the contactor is permissible, however, if the contacts can be easily separated.

4) A short-circuit current of $I_q \leq 6$ kA applies to type of coordination "2".

Contactors			
Type			**3TK20**
Control			
Coil operating range[1]			0.8 ... 1.1 x U_s
Power consumption of the magnetic coils (when coil is cold and 1.0 x U_s)			
Standard version			
AC operation, 50 Hz	• Closing	VA	15
	• p.f.		0.41
	• Closed	VA	6.8
	• p.f.		0.42
AC operation, 60 Hz	• Closing	VA	14.4
	• p.f.		0.36
	• Closed	VA	6.1
	• p.f.		0.46
AC operation, 50/60 Hz[1]	• Closing	VA	16.5/13.2
	• Pp.f.		0.43/0.38
	• Closed	VA	8.0/5.4
	• p.f.		0.48/0.42
For USA and Canada			
AC operation, 50 Hz	• Closing	VA	14.6
	• p.f.		0.38
	• Closed	VA	6.5
	• p.f.		0.40
AC operation, 60 Hz	• Closing	VA	14.4
	• p.f.		0.30
	• Closed	VA	6.0
	• p.f.		0.44
DC operation	Closing = Closed	W	3
Permissible residual current of the electronic circuit[2] (for 0 signal)			
	AC operation	mA	≤ 3 x (230 V/U_s)
	DC operation	mA	≤ 1 x (230 V/U_s)
Operating times at 0.8 ... 1.1 x U_s[3] Total break time = Opening delay + Arcing time			
Values apply with coil in cold state and at operating temperature for operating range			
• AC operation	Closing delay	ms	5 ... 19
	Opening delay	ms	2 ... 22
Dead interval			To use the 3TK20 AC-operated contactor in reversing duty an additional dead interval of 50 ms is required along with an NC contact interlock.
• DC operation	Closing delay	ms	16 ... 65
	Opening delay	ms	2 ... 5
Arcing time		ms	10 ... 15
Operating times at 1.0 x U_s[3]			
• AC operation	Closing delay	ms	5 ... 18
	Opening delay	ms	3 ... 21
Dead interval			To use the 3TK20 AC-operated contactor in reversing duty an additional dead interval of 50 ms is required along with an NC contact interlock.
• DC operation	Closing delay	ms	19 ... 31
	Opening delay	ms	3 ... 4
Arcing time		ms	10 ... 15

1) Applies to 50/60 Hz coil:
At 50 Hz, 1.1 x U_s, side-by-side mounting and 100% ON period the max. ambient temperature is +40 °C.

2) The 3TX4 490-1J additional load module is recommended for higher residual currents (see Catalog LV 1).

3) The opening times of the NO contacts and the closing times of the NC contacts increase if the contactor coils are protected against voltage peaks (noise suppression diode 6 to 10 times, diode assemblies 2 to 6 times, varistor +2 to 5 ms).

3TK20 Contactors

4-pole, 4 kW

Contactors	Type			3TK20 ..-0...	3TK20 ..-3..., 3TK20 ..-6..., 3TK20 ..-7...
Size 00					
Main circuit					
AC capacity					
Utilization category AC-1, switching resistive loads					
Rated operational current I_e (for 40 °C)	up to 400/380 V	A		18	18
	690/660 V	A		18	--
Rated operational current I_e (for 55 °C)	400/380 V	A		16	16
	690/660 V	A		16	--
Rated output power of AC loads p.f. = 1	at 230/220 V	kW		6.0	6.0
	400/380 V	kW		10	10
	500 V	kW		13	13
	690/660 V	kW		17	--
Minimum conductor cross-section for loads with I_e		mm^2		2.5	2.5
Utilization category AC-2 and AC-3					
Rated operational current I_e	up to 220 V	A		9.0	9.0
	230 V	A		9.0	9.0
	380 V	A		9.0	9.0
	400 V	A		8.4	8.4
	500 V	A		6.5	6.5
	660 V	A		5.2	--
	690 V	A		5.2	--
Rated output power for motors with slip ring or squirrel-cage rotors at 50 Hz and 60 Hz and	at 110 V	kW		1.2	1.2
	115 V	kW		1.2	1.2
	120 V	kW		1.3	1.3
	127 V	kW		1.4	1.4
	200 V	kW		2.2	2.2
	220 V	kW		2.4	2.4
	230 V	kW		2.5	2.5
	240 V	kW		2.6	2.6
	380 V	kW		4.0	4.0
	400 V	kW		4.0	4.0
	415 V	kW		4.0	4.0
	440 V	kW		4.0	4.0
	460 V	kW		4.0	4.0
	500 V	kW		4.0	4.0
	575 V	kW		4.0	--
	660 V	kW		4.0	--
	690 V	kW		4.0	--
Utilization category AC-4					
(contact endurance approx. 200 000 operating cycles at I_a = 6 x I_e)					
Rated operational current I_e	up to 400 V	A		2.6	2.6
	690 V	A		1.8	--
Rated output power for motors with squirrel-cage rotor at 50 Hz and 60 Hz and	at 110 V	kW		0.32	0.32
	115 V	kW		0.33	0.33
	120 V	kW		0.35	0.35
Max. permissible rated operational current I_e/AC-4 ≙ I_e/AC-3 up to 500 V, for reduced contact endurance and reduced operating frequency	127 V	kW		0.37	0.37
	200 V	kW		0.58	0.58
	220 V	kW		0.64	0.64
	230 V	kW		0.67	0.67
	240 V	kW		0.70	0.70
	380 V	kW		1.10	1.10
	400 V	kW		1.15	1.15
	415 V	kW		1.20	1.20
	440 V	kW		1.27	1.27
	460 V	kW		1.33	1.33
	500 V	kW		1.45	1.45
	575 V	kW		1.30	--
	660 V	kW		1.10	--
	690 V	kW		1.15	--

Contactors	Type			3TK20 ..-0...	3TK20 ..-3..., 3TK20 ..-6..., 3TK20 ..-7...
Size 00					
Main circuit					
AC capacity					
Utilization category AC-5a, switching gas discharge lamps					
Per main conducting path at 230/220 V					
Rated output power per lamp		Rated operational current per lamp (A)			
Uncorrected					
L 18 W		0.37	units	43	
L 36 W		0.43	units	37	
L 58 W		0.67	units	23	
Lead-lag circuit					
L 18 W		011	units	144	
L 36 W		0.21	units	76	
L 58 W		0.32	units	50	
Switching gas discharge lamps with correction, solid-state ballast					
Per main conducting path at 230/220 V					
Rated output power per lamp	Capacitance (µF)	Rated operational current per lamp (A)			
Parallel correction					
L 18 W	4.5	0.11	units	22	
L 36 W	4.5	0.21	units	22	
L 58 W	7	0.31	units	14	
With solid-state ballast (single lamp)					
L 18 W	6.8	0.10	units	63	
L 36 W	6.8	0.18	units	35	
L 58 W	10	0.27	units	23	
With solid-state ballast (two lamps)					
L 18 W	10	0.18	units	35	
L 36 W	10	0.35	units	18	
L 58 W	22	0.52	units	12	
Utilization category AC-5b, switching incandescent lamps			kW	1.6	--
Per main conducting path at 230/220 V					
Utilization category AC-6a, switching AC transformers					
Rated operational current I_e					
• For inrush current n = 20		at 400 V	A	5.1	5.1
• For inrush current n = 30		at 400 V	A	3.3	3.3
Rated power P					
• For inrush current n = 20		up to 230/220 V	kVA	2.0	2.0
		400/380 V	kVA	3.5	3.5
		500 V	kVA	4.6	4.6
		690/660 V	kVA	6.0	--
• For inrush current n = 30		up to 230/220 V	kVA	1.3	1.3
		400/380 V	kVA	2.3	2.3
		500 V	kVA	3.1	3.1
		690/660 V	kVA	4.0	--
For deviating inrush current factors x, the power must be recalculated as follows: $P_x = P_{n30} \times (30/x)$					
Utilization category AC-6b, switching low-inductance (low-loss, metallized dielectric) AC capacitors				No switching capacity	
Utilization category AC-7a, switching low inductive loads in household appliances					
Rated operational current I_e (for 55 °C)		at 400/380 V	A	16	16
		690/660 V	A	16	--
Rated output power at 50 and 60 Hz		at 230/220 V	kW	6	6
		400/380 V	kW	10	10
Minimum conductor cross-section for loads with I_e			mm^2	2.5	2.5
Utilization category AC-7b, switching motor loads in household appliances					
Rated operational current I_e		up to 220 V	A	9.0	9.0
		230 V	A	9.0	9.0
		380 V	A	9.0	9.0
		400 V	A	8.4	8.4
Rated output power of motors at 50 Hz and 60 Hz and		at 110 V	kW	1.2	1.2
		220 V	kW	2.4	2.4
		230 V	kW	2.5	2.5
		240 V	kW	2.6	2.6
		380 V	kW	4.0	4.0
		400 V	kW	4.0	4.0

3TK20 Contactors

4-pole, 4 kW

Contactors	Type			3TK20 ..-0...	3TK20 ..-3..., 3TK20 ..-6..., 3TK20 ..-7...
Size 00					
Main circuit					
Load rating with DC					
Utilization category DC-1 Switching resistive loads (contact endurance 0.1 x 10^6 operating cycles; $L/R \leq 1$ ms)					
Rated operational current I_e (for 55 °C)					
• 1 current path		up to 24 V	A	16	16
		60 V	A	6	6
		110 V	A	2	2
		220/240 V	A	1	1
• 2 current paths in series		up to 24 V	A	16	16
		60 V	A	16	16
		110 V	A	6	6
		220/240 V	A	2	2
• 3 current paths in series		up to 24 V	A	16	16
		60 V	A	16	16
		110 V	A	16	16
		220/240 V	A	6	6
Utilization category DC-3 and DC-5, shunt-wound and series-wound motors ($L/R \leq 15$ ms)					
Rated operational current I_e (for 55 °C)					
• 1 current path		up to 24 V	A	6	6
		60 V	A	3	3
		110 V	A	0.5	0.5
		220/240 V	A	0.1	0.1
• 2 current paths in series		up to 24 V	A	10	10
		60 V	A	5	5
		110 V	A	2	2
		220/240 V	A	0.5	0.5
• 3 current paths in series		up to 24 V	A	16	16
		60 V	A	16	16
		110 V	A	16	16
		220/240 V	A	2	2
Thermal load capacity		10 s current	A	70	
Power loss per conducting path		at I_e/AC-3	W	0.3	
Operating frequency					
Operating frequency *z* in operating cycles/hour					
• Contactors without overload relays	No-load operating frequency		h^{-1}	10000	
Dependence of the operating frequency z' on the operational current I' and operational voltage U': $z' = z \cdot (I_e/I') \cdot (400\ V/U')^{1.5} \cdot 1/h$	AC-1		h^{-1}	1000	
	AC-2		h^{-1}	500	
	AC-3		h^{-1}	1000	
• Contactors with overload relays (mean value)			h^{-1}	15	
Conductor cross-sections					
Screw terminal	**Main and auxiliary conductors**				
	Solid		mm^2	2 x (0.5 ... 2.5), 1 x 4 2 x (20 ... 14) AWG, 1 x 12 AWG	
	Finely stranded with end sleeve		mm^2	2 x (0.5 ... 1.5), 1 x 2.5	
	Pin-end connector (DIN 46231)		mm^2	1 x 1 ... 2.5	
	Terminal screw			M3	
Prescribed tightening torque for terminal screws			Nm lb.in	0.8 ... 1.3 7 ... 11	
Flat connector					
When using a quick-connect terminal	6.3 ... 1		mm^2	0.5 ... 1	
Finely stranded	6.3 ... 2.5		mm^2	1 ... 2.5	
Solder pin connection				Only for printed circuit boards	

Contactors Type				3TK20 ..-0...	3TK20 ..-3..., 3TK20 ..-6..., 3TK20 ..-7...
Size 00					
cULus and CSA rated data of the 3TK20 contactors					
Rated insulation voltage U_i			V AC	600	300
Uninterrupted current	Open and enclosed		A	16	16 (10 for solder pin connection)
Maximum horsepower ratings (cULus and CSA approved values)					
Rated output power for induction motors with 60 Hz					
1-phase	at 115 V		hp	0.5	--
	200 V		hp	1	1
	230 V		hp	1.5	1
	460/575 V		hp	--	--
3-phase	at 115 V		hp	--	--
	200 V		hp	3	3 (1 for 3TK20 ..-6)
	230 V		hp	3	3 (1 for 3TK20 ..-6)
	460/575 V		hp	5	--
Overload relay	Type/ Setting range			3UA7/EB 8 ... 10 A	

Contactors Type				3TK20
Size 00				
Rated data of the auxiliary contacts acc. to IEC 60947-5-1/DIN VDE 0660 Part 200				
Rated insulation voltage U_i (pollution degree 3)			V	690
Continuous thermal current I_{th} = Rated operational current I_e/AC-12			A	10
AC load Rated operational current I_e/AC-15/AC-14				
For rated operational voltage U_e		24 V	A	4
		110 V	A	4
		125 V	A	4
		220 V	A	4
		230 V	A	4
		380 V	A	3
		400 V	A	3
		500 V	A	2
		660 V	A	1
		690 V	A	1
DC load Rated operational current I_e/DC-12				
For rated operational voltage U_e		24 V	A	4
		48 V	A	2.2
		110 V	A	1.1
		125 V	A	1.1
		220 V	A	0.5
		440 V	A	--
		600 V	A	--
Rated operational current I_e/DC-13				
For rated operational voltage U_e		24 V	A	2.1
		48 V	A	1.1
		110 V	A	0.52
		125 V	A	0.52
		220 V	A	0.27
		440 V	A	--
		600 V	A	--
cULus, CSA and TÜV rated data of the auxiliary contacts				
Rated voltage, max.			V AC	600
Auxiliary switch blocks, max.			V AC	300
Switching capacity				A 600, Q 300
Uninterrupted current at 240 V AC			A	10

3RT15 Contactors

4-pole, 2 NO + 2 NC, 4 ... 18.5 kW

Overview

AC and DC operation

EN 60947-4-1 (VDE 0660, Part 102)

The contactors are suitable for use in any climate. They are finger-safe according to EN 50274.

The accessories for the 3-pole SIRIUS contactors can also be used for the 4-pole versions.

Function

- Changing the polarity of hoisting gear motors
- Switching two separate loads

Note

3RT15 contactors are not suitable for switching a load between two current sources.

Integration

Mountable auxiliary contacts

Size S00

4 auxiliary contacts (auxiliary switch blocks according to EN 50005)

Size S0

Maximum 2 auxiliary contacts (either laterally mounted or snapped onto the top auxiliary switch blocks according to EN 50012 and EN 50005).

Size S2

Maximum 4 auxiliary contacts (either laterally mounted or snapped onto the top auxiliary switch blocks to EN 50012 and EN 50005).

Technical specifications

Contactor	Type Size		3RT15 16 S00	3RT15 17 S00	3RT15 26 S0	3RT15 35 S2
General data						
Permissible mounting position [1]						
Mechanical endurance		Operating cycles	30 million		10 million	
Electrical endurance at I_e/AC-1		Operating cycles	Approx. 0.5 million			
Rated insulation voltage U_i (pollution degree 3)		V	690			
Permissible ambient temperature	During operation During storage	°C °C	-25 ... +60 -55 ... +80			
Degree of protection acc. to EN 60947-1, Appendix C			IP20		IP20 (IP00 terminal enclosure)	
Touch protection acc. to EN 50274			Finger-safe			
Short-circuit protection of contactors without overload relays						
Main circuit						
Fuse links, gL/gG NH 3NA, DIAZED 5SB, NEOZED 5SE	Type of coordination "1" Type of coordination "2"	A A	35 20		63 35	160 80
- Acc. to IEC 60947-4-1/ EN 60947-4-1	Weld-free	A	10		16	50
Control						
Coil operating range						
	AC at 50 Hz AC at 60 Hz		0.8 ... 1.1 x U_s 0.85 ... 1.1 x U_s			
	DC at 50 °C DC at 60 °C AC/DC		0.8 ... 1.1 x U_s 0.85 ... 1.1 x U_s		0.8 ... 1.1 x U_s	
Power consumption of the magnetic coils (when coil is cold and 1.0 x U_s)						
AC operation, 50 Hz	•Closing •p.f. •Closed •p.f.	VA VA VA VA			61 0.82 7.8 0.24	145 0.79 12.5 0.36
AC operation, 50/60 Hz	•Closing •p.f. •Closed •p.f.	VA VA VA VA	26.5/24.3 0.79/0.75 4.4/3.4 0.27/0.27		64/63 0.82/0.74 8.4/6.8 0.24/0.28	170/155 0.76/0.72 15/11.8 0.35/0.38
DC operation	Closing = Closed	W	3.3		5.6	13.3
Operating times for 0.8 ... 1.1 x U_s [2] Total break time = Opening delay + Arcing time						
AC/DC operation						
• DC operation	Closing delay Opening delay	ms ms	25 ... 100 7 ... 10		30 ... 90 13 ... 40	50 ... 110 15 ... 30
• AC operation	Closing delay Opening delay	ms ms	8 ... 35 4 ... 30		6 ... 30 13 ... 25	4 ... 35 10 ... 30
• Arcing time		ms	10 ... 15			

1) In accordance with the corresponding 3-pole 3RT1 contactors.

2) With size S00, DC operation: switching times at 0.85 ... 1.1 x U_s

Contactor Type Size			3RT15 16 S00	3RT15 17 S00	3RT15 26 S0	3RT15 35 S2
Main circuit						
AC capacity						
Utilization category AC-1, switching resistive loads						
Rated operational currents I_e	at 40 °C up to 690 V	A	18	22	40	60
	at 60 °C up to 690 V	A	16	20	35	55
Rated output power for AC loads p.f. = 0.95 (for 60 °C)	at 230 V	kW	6.5	7.5	15	20
	400 V	kW	11	13	26	36
Minimum conductor cross-section for loads with I_e	at 40 °C	mm²	2.5	2.5	10	16
Utilization category AC-2 and AC-3						
Rated operational current I_e (at 60 °C)	up to 400 V	A	9	12	25 [1]	40
Rated output power of slipring or squirrel-cage motors at 50 and 60 Hz	at 230 V	kW	3	3	5.5	9.5
	400 V	kW	4	5.5	11	18.5
Load rating with DC						
Utilization category DC-1, switching resistive loads (L/R ≤ 1 ms)						
Rated operational current I_e (at 60 °C)						
• 1 current path	up to 24 V	A	16	20	35	50
	60 V	A	16	20	20	23
	110 V	A	2.1	2.1	4.5	4.5
	220 V	A	0.8	0.8	1	1
	440 V	A	0.6	0.6	0.4	0.4
• 2 current paths in series	up to 24 V	A	16	20	35	50
	60 V	A	16	20	35	45
	110 V	A	12	12	35	45
	220 V	A	1.6	1.6	5	5
	440 V	A	0.8	0.8	1	1
Utilization category DC-3/DC-5 [2], shunt-wound and series-wound motors (L/R ≤ 15 ms)						
Rated operational current I_e (at 60 °C)						
• 1 current path	up to 24 V	A	16	20	20	35
	60 V	A	0.5	0.5	5	6
	110 V	A	0.15	0.15	2.5	2.5
	220 V	A	0.75	0.75	1	1
	440 V	A	--	--	0.09	0.1
• 2 current paths in series	up to 24 V	A	16	20	35	50
	60 V	A	5	5	35	45
	110 V	A	0.35	0.35	15	25
	220 V	A	--	--	3	5
	440 V	A	--	--	0.27	0.27

1) For AC operation: 25 A,
DC operation: 20 A.

2) For U_s > 24 V the rated operational currents I_e for the NC contact conducting paths are 50 % of the values for the NO contact conducting paths.

3RT16 Capacitor Contactors

12.5 ... 50 kvar

Overview

AC operation

IEC 60947, EN 60947 (VDE 0660)

The contactors are suitable for use in any climate. They are finger-safe according to EN 50274.

The 3RT16 capacitor switching contactors are special variants of the size S00 to S3 SIRIUS contactors. The capacitors are pre-charged by means of the mounted leading NO contacts and resistors; only then do the main contacts close.

This prevents disturbances in the power system and welding of the contactors.

Only discharged capacitors are permitted to be switched on with capacitor contactors.

The auxiliary switch block which is snapped onto the capacitor contactor contains the three leading NO contacts and in the case of S00 one standard NC contact and in the case of S0 and S3 one standard NO contact, which is unassigned. Size S00 also contains another unassigned NO contact in the basic unit.

In addition, a 2-pole auxiliary contact block can be mounted laterally on the 3RT16 47 capacitor contactors (2 NO, 2 NC or 1 NO + 1 NC versions); Type 3RH19 21-1EA ... . The fitting of auxiliary switches for 3RT16 17 and 3RT16 27 is not expandable.

For the capacitor making and switching capacity of the basic 3RT10 contactor variant, see Technical Specifications.

Technical specifications

All technical specifications not mentioned in the table below are identical to those of the 3RT10 17 contactors for size S00, to those of the 3RT10 26 contactors for size S0 and to those of the 3RT10 45 contactors for size S3.

Contactor	Type Size			**3RT16 17-.A..3** **S00**	**3RT16 27-.A..1** **S0**	**3RT16 47-.A..1** **S3**
Capacitor rating at **rated output power** (utilization category AC-6b)		230 V, 50/60 Hz **400 V, 50/60 Hz** 525 V, 50/60 Hz 690 V, 50/60 Hz	kvar **kvar** kvar kvar	3 ... 7.5 **5 ... 12.5** 7.5 ... 15 10 ... 21	3.5 ... 15 **6 ... 25** 7.8 ... 30 10 ... 42	3.5 ... 30 **5 ... 50** 7.5 ... 60 10 ... 84
Auxiliary contacts mounted (unassigned)				1 NO + 1 NC	1 NO	
Auxiliary contacts mountable (lateral), not for sizes S00 and S0				--		2 NC + 2 NO or 1 NO + 1 NC
Operating range of the coils				0.8 ... 1.1 x U_s		
Max. operating frequency			h^{-1}	180	100	
Electrical endurance			Operating cycles	> 250000	> 150000	> 100000
Ambient temperature			°C	60		
Regulations				IEC 60947/EN 60947 (VDE 0660)		
Short-circuit protection				1.6 ... 2.2 x I_e		

Contactor	Type Size		3RT16 17-.A..3 S00	3RT16 27-.A..1 S0	3RT16 47-.A..1 S3
Conductor cross-sections					
Screw terminals (1 or 2 conductors connectable)	**Main conductors:**				
	• Solid	mm²	2 x (0.5 ... 1.5); 2 x (0.75 ... 2.5) acc. to IEC 60947; max. 2 x (1 ... 4)	2 x (1 ... 2.5); 2 x (2.5 ... 6) acc. to IEC 60947; max. 1 x 10[1)]	
	• Finely stranded with end sleeve	mm²	2 x (0.5 ... 1.5); 2 x (0.75 ... 2.5)	2 x (1 ... 2.5); 2 x (2.5 ... 6) [1)]	
	• AWG cables - Solid - Solid or stranded - Stranded	 AWG AWG AWG	 2 x (20 ... 16) 2 x (18 ... 14) 1 x 12	 2 x (16 ... 12) 2 x (14 ... 10) 1 x 8	
	• Terminal screws - Tightening torque	 Nm lb.in	M3 0.8 ... 1.2 7 ... 10.3	M4 (Pozidriv size 2) 2 ... 2.5 18 ... 22	
	Main conductors:				
	With box terminal				
Front clamping point connected 	• Finely stranded with end sleeve • Finely stranded without end sleeve	mm² mm²			2.5 ... 35 4 ... 50
	• Solid • Stranded	mm² mm²			2.5 ... 16 4 ... 70
	• Ribbon cable conductors (number x width x circumference)	mm			6 x 9 x 0.8
	• AWG conductors, solid or stranded	AWG			10 ... 2/0
Rear clamping point connected 	• Finely stranded with end sleeve • Finely stranded without end sleeve	mm² mm²			2.5 ... 50 10 ... 50
	• Solid • Stranded	mm² mm²			2.5 ... 16 10 ... 70
	• Ribbon cable conductors (number x width x circumference)	mm			6 x 9 x 0.8
	• AWG conductors, solid or stranded	AWG			10 ... 2/0
Both clamping points connected 	• Finely stranded with end sleeve • Finely stranded without end sleeve	mm² mm²			Max. 2 x 35 Max. 2 x 35
	• Solid • Stranded • Ribbon cable conductors (number x width x circumference)	mm² mm² mm			Max. 2 x 16 Max. 2 x 50 2 x (6 x 9 x 0.8)
	• AWG conductors, solid or stranded	AWG			2 x (10 ... 1/0)
	• Terminal screw - Tightening torque	 Nm lb.in			M6 (hex. socket, A/F 4) 4 ... 6 36 ... 53
Connection for drilled copper bars[2)]	Max. width	mm			10
Without box terminal with cable lugs[3)] (1 or 2 conductors connectable)	• Finely stranded with cable lug • Stranded with cable lug	mm² mm²			10 ... 50[4)] 10 ... 70[4)]
	• AWG conductors, solid or stranded	AWG			7 ... 1/0
	Auxiliary conductors:				
	• Solid	mm²	2 x (0.5 ... 1.5); 2 x (0.75 ... 2.5) acc. to IEC 60947; max. 2 x (1 ... 4)	2 x (0.5 ... 1.5); 2 x (0.75 ... 2.5) acc. to IEC 60947; max. 2 x (0.75 ... 4)	
	• Finely stranded with end sleeve	mm²	2 x (0.5 ... 1.5); 2 x (0.75 ... 2.5)		
	• AWG conductors, solid or stranded	AWG	2 x (20 ... 16); 2 x (18 ... 14) 1 x 12		
	• Terminal screw - Tightening torque	 Nm lb.in	M3 0.8 ... 1.2 7 ... 10.3		
Cage Clamp terminals (1 or 2 conductors connectable)	**Auxiliary conductors:**				
	• Solid	mm²	2 x (0.25 ... 2.5)		
	• Finely stranded with end sleeve • Finely stranded without end sleeve	mm² mm²	2 x (0.25 ... 1.5) 2 x (0.25 ... 2.5)		
	• AWG conductors, solid or stranded	AWG	2 x (24 ... 14)		

1) 3RV19 25-5AB infeed terminal for 16 mm².

2) If bars larger than 12 x 10 mm are connected, a 3RT19 46-4EA1 terminal cover is needed to comply with the phase clearance.

3) When connecting conductors which are larger than 25 mm², the 3RT19 46-4EA1 cover must be used to keep the phase clearance.

4) Only with crimped cable lugs according to DIN 46234.
Cable lug max. 20 mm wide.

Contactors with Extended Tolerance 0.7 ... 1.25 x U_s , for Railway Applications

3RH11 contactor relays

Overview

DC operation

IEC 60947-4-1, EN 60947-4-1 (VDE 0660, Part 102), for requirements according to IEC 60077-1 and IEC 60077-2.

The contactor relays are finger-safe according to EN 50274. The size S00 contactor relays have Cage Clamp terminals for all terminals.

Ambient temperature

The permissible ambient temperature for operation of the contactor relays (across the full coil operating range) is -40 °C to +70 °C.

Uninterrupted duty at temperatures > +55 °C reduces the mechanical endurance, the current-carrying capacity of the conducting paths and the operating frequency.

Application

For operation in installations which are subject both to considerable variations in the control voltage and to high ambient temperatures, e.g. railway applications under extreme climatic conditions, rolling mills, etc.

Function

Control and auxiliary circuits

The coils of the contactor relays have an extended tolerance from 0.7 to 1.25 x U_s and are fitted as standard with varistors to provide protection against voltage surges. The opening delay is consequently 2 to 5 ms longer than for standard contactors.

3RH11..-0LA0

The DC solenoid systems of the contactor relays are modified (to hold-in coil) by means of a series resistor.

The size S00 contactor relays are supplied prewired with a plug-on module containing the series resistor. The varistor is integrated. A 4-pole auxiliary switch block (according to EN 50005) can be fitted additionally.

Installation

At ambient temperatures up to 70 °C, the size S00 contactor relays are allowed to be mounted side by side.

3RH11 22-2K.40

These contactor relays have an extended tolerance from 0.7 to 1.25 x U_s; the coils are fitted with varistors as standard. An additional series resistor is not required. Please note:

- Size S00: It is not possible to mount an auxiliary switch block.

At ambient temperatures > 60 °C ≤ 70 °C, a clearance of 10 mm is required when they are mounted side by side.

Technical specifications

Contactor	Type		3RH11 ..
Coil operating range	AC/DC		0.7 ... 1.25 x U_s
Power input of the solenoids			for cold coil and 1.0 x U_s
Contactors with series resistor	Closing	W	11
	Closed	W	4
Contactors without series resistor	Closing	W	2.3
	Closed	W	2.3
Upright mounting position			3RH11 22-2K.40: please ask 3RH11 22-2K.40-0LA0 standard version

All specifications and technical specifications not mentioned here are identical to those of the standard contactors.

Overview

3TH4 contactor relays

EN 60947-4-1.

For requirements according to IEC 60077-1 and IEC 60077-2.

The contactors are finger-safe according to EN 50274. Terminal covers may have to be fitted onto the connecting bars, depending on the configuration with other devices.

Application

For operation in plants which are subject both to considerable variations in the control voltage and to high ambient temperatures, e.g. in railway applications.

Function

Control and auxiliary circuits

The coils of the contactors have an extended coil operating range from 0.7 to 1.25 x U_s and are fitted as standard with varistors to provide protection against voltage surges. The opening delay is consequently 2 ms to 5 ms longer than for standard contactors.

All specifications and technical specifications not mentioned here are identical to those of the standard contactor relays 3TH4.

Ambient temperature

The permissible ambient temperature for operation of the contactors (across the full coil operating range) is -50 to +70 °C. Uninterrupted duty at temperatures < -25 °C and > +55 °C reduces the mechanical endurance, the current-carrying capacity of the conducting paths and the operating frequency.

Installation

At ambient temperatures > 55 °C, a distance of 10 mm must be observed if contactor relays and size 1 and 2 contactors are mounted side by side. There is no need to reduce the technical specifications.

Technical specifications

Contactor	Type			3TH42
Coil voltage operating range				0.7 ... 1.25 x U_s
Power consumption of the magnetic coil (for cold coil)				
		0.7 x U_s	W	2.6
		1.0 x U_s	W	5.2
		1.25 x U_s	W	8.2
(for cold coil: Closing = Closed)				
Permissible ambient temperature	During operation		°C	-50 ... +70[1]
	During storage		°C	-55 ... +80
Permissible residual current of the electronics (with 0 signal)				
		DC operation		≤ 10 mA x (24 V/U_s)
Operating times (Total break time = OFF-delay + Arcing time)				
• Closing				
- 0.7 x U_s	ON-delay (NO)		ms	70 ... 200
	OFF-delay (NC)		ms	28 ... 33
- 1 x U_s	ON-delay (NO)		ms	45 ... 80
	OFF-delay (NC)		ms	30 ... 34
- 1.25 x U_s	ON-delay (NO)		ms	40 ... 60
	OFF-delay (NC)		ms	31 ... 35
• Off-switching				
- 0.7 ... 1.25 x U_s	OFF-delay (NO)		ms	20 ... 30
	ON-delay (NC)		ms	22 ... 32
• Arcing time			ms	10

1) Series-mounting with 10 mm distance.

Contactors with Extended Tolerance 0.7 ... 1.25 x U_s , for Railway Applications

3RT10 motor contactors, 5.5 ... 45 kW

Overview

DC operation

IEC 60947-4-1, EN 60947-4-1 (VDE 0660, Part 102), for requirements according to IEC 60077-1 and IEC 60077-2.

The contactors are finger-safe according to EN 50274 (exception: series resistors S0 to S3). The contactors are available with both Cage Clamp and screw terminals. The size S00 contactors have Cage Clamp terminals for all connections. The auxiliary conductor and coil terminals of sizes S0 to S3 are all Cage Clamp terminals.

Ambient temperature

The permissible ambient temperature for operation of the contactors (across the full coil operating range) is -40 °C to +70 °C.

Uninterrupted duty at temperatures > +55 °C reduces the mechanical endurance, the current-carrying capacity of the conducting paths and the operating frequency.

Dimensions

Attaching resistors increases the width of contactor sizes S0 to S3 (see Dimensional Drawings).

Application

For operation in installations which are subject both to considerable variations in the control voltage and to high ambient temperatures, e.g. railway applications under extreme climatic conditions, rolling mills, etc.

Function

Control and auxiliary circuits

The coils of the contactors have an extended tolerance from 0.7 to 1.25 x U_s and are fitted as standard with varistors to provide protection against voltage surges. The opening delay is consequently 2 to 5 ms longer than for standard contactors.

3RT10 ..-0LA0

The DC solenoid systems of the contactors are modified (to hold-in coil) by means of a series resistor.

The size S00 contactors are supplied prewired with a plug-on module containing the series resistor. The varistor is integrated. A 4-pole auxiliary switch block (according to EN 50005) can be fitted additionally.

The size S0 to S3 contactors are equipped on the front with an auxiliary switch block with 2 NO + 2 NC contacts. The separate series resistor, which is attached laterally next to the contactor on the 35 mm standard mounting rail, is fitted with connecting leads for mounting the contactors. A circuit diagram showing the terminals is stuck onto each contactor. One NC of the auxiliary contacts is required for the series resistor function. The selection and ordering data shows the number of additional, unassigned auxiliary contacts. It is only possible to extend the number of auxiliary contacts with size S00.

Installation

At ambient temperatures up to 70 °C, the size S00 contactors and contactor relays are allowed to be mounted side by side. The resistor module of the size S0 to S3 contactors must be mounted to the left of the contactor owing to the prefabricated connecting leads.

3RT10 17-2K.4.,
3RT10 2.-3K.40

These contactors have an extended tolerance from 0.7 to 1.25 x U_s; the coils are fitted with varistors as standard. An additional series resistor is not required.

Please note:

- Size S00: It is not possible to mount an auxiliary switch block.
- Size S0: up to two single-pole auxiliary switch blocks can be mounted.

At ambient temperatures > 60 °C ≤ 70 °C, a clearance of 10 mm is required when they are mounted side by side.

3RT10 contactors with contactor control unit, extended tolerance

Control and auxiliary circuits

The coils of the contactors have an extended tolerance from 0.7 to 1.25 x U_s and are fitted as standard with varistors to provide protection against voltage surges. The opening delay is consequently 2 ms to 5 ms longer than for standard contactors.

3RT10 ..-.X.40-0LA2

The contactors are energized via upstream control electronics which ensure the coil operating range of 0.7 to 1.25 x U_s at an ambient temperature of 70 °C. They are supplied as complete self-contained units with a built-on contactor control unit. A varistor is integrated for damping opening surges in the coil.

The possibility of mounting auxiliary switches is the same as that for equivalent standard contactors.

Installation

At ambient temperatures up to 70 °C, sizes S0 to S3 of these contactor versions are allowed to be mounted side by side.

Ambient temperature

The permissible ambient temperature for operation of the contactors (across the full coil operating range) is -40 °C to +70 °C. Uninterrupted duty at temperatures > +55 °C reduces the mechanical endurance, the current-carrying capacity of the conducting paths and the operating frequency.

Dimensions

Because of the built-on contactor control unit, the height of the size S0 to S3 contactors increases by up to 34 mm (see Dimensional Drawings).

Technical specifications

Contactor	Type		3RT10 17	3RT10 2.	3RT10 3.	3RT10 4.
Coil operating range	AC/DC		0.7 ... 1.25 x U_s			
Power input of the solenoids			For cold coil and 1.0 x U_s			
Contactors with series resistor	Closing	W	11	23	46	78
	Closed	W	4	7	14	23
Contactors without series resistor	Closing	W	2.3	4.2	--	--
	Closed	W	2.3	4.2	--	--
Upright mounting position			Standard version	3RT10 2.-3K.40: Special version required 3RT10 2.-3K.44-0LA0: Special version required	--	--

All specifications and technical specifications not mentioned here are identical to those of the standard contactors.

Order No.	Type		3RT10 2.	3RT10 3.	3RT10 4.
3RT10 contactors with contactor control unit					
Coil operating range			0.7 ... 1.25 x U_s		
Power consumption for cold coil and 1.0 x U_s Closing = Closed		W	6	15	19
Upright mounting position			Special version required	--	

All specifications and technical specifications not mentioned here are identical to those of the standard contactors.

Contactors with Extended Tolerance 0.7 ... 1.25 x U_s , for Railway Applications

3TB5 motor contactors, 55 ... 200 kW

Overview

EN 60947-4-1.

For requirements according to IEC 60077-1 and IEC 60077-2.

The contactors are finger-safe according to EN 50274. Terminal covers may have to be fitted onto the connecting bars, depending on the configuration with other devices.

Application

For operation in plants which are subject both to considerable variations in the control voltage and to high ambient temperatures, e.g. in railway applications.

Function

Control and auxiliary circuits

The coils of the contactors have an extended coil operating range from 0.7 to 1.25 x U_s and are fitted as standard with varistors to provide protection against voltage surges. The opening delay is consequently 2 ms to 5 ms longer than for standard contactors.

The DC solenoid systems of the 3TB contactors must be modified (to hold-in coil) by means of a series resistor.

This series resistor is supplied separately packed with the contactors. With types 3TB50, the series resistor must be attached onto the right-hand side of the auxiliary switch block by means of the enclosed mounting parts and sets of links provided.

With types 3TB52/54/56, the series resistor must be attached separately next to the contactors. One NC of the auxiliary contacts is required for the series resistor function. The selection and ordering data show the number of additional, unassigned auxiliary contacts. It is not possible to extend the number of auxiliary contacts.

With the 3TB52 and larger contactors, the series resistor must be connected using an additional K2 reversing contactor (3RT13 17-1F.40). This contactor is automatically included in the delivery in the same packaging as the contactor.

All specifications and technical specifications not mentioned here are identical to those of the standard 3TB contactors.

Ambient temperature

The permissible ambient temperature for operation of the contactors (across the full coil operating range) is -50 to +70 °C. Uninterrupted duty at temperatures < -25 °C and > +55 °C reduces the mechanical endurance, the current-carrying capacity of the conducting paths and the operating frequency.

Installation

At ambient temperatures > 55 °C, a distance of 10 mm must be observed if contactor relays and size 1 and 2 contactors are mounted side by side. There is no need to reduce the technical specifications.

Dimensions

Attaching resistors and varistors increases the width of the contactors (see Dimensional drawings).

Technical specifications

Contactor	Type		3TB50	3TB52	3TB54	3TB56
Coil operating range			0.8 ... 1.1 x U_s			
Power input of the solenoids			For cold coil and 1.0 x U_s			
Closing		W	38	40	190	295
Closed		W	20	21	43	59

Overview

EN 60947-4-1.

For requirements according to IEC 60077-1 and IEC 60077-2.

The contactors are finger-safe according to EN 50274. Terminal covers may have to be fitted onto the connecting bars, depending on the configuration with other devices.

Application

For operation in plants which are subject both to considerable variations in the control voltage and to high ambient temperatures, e.g. in railway applications.

Function

Control and auxiliary circuits

The coils of the contactors have an extended coil operating range from 0.7 to 1.25 x U_s and are fitted as standard with varistors to provide protection against voltage surges. The opening delay is consequently 2 ms to 5 ms longer than for standard contactors.

The DC solenoid systems of the 3TC contactors must be modified (to hold-in coil) by means of a series resistor.

This series resistor is supplied separately packed with the contactors. With types 3TC48, the series resistor must be attached onto the right-hand side of the auxiliary switch block by means of the enclosed mounting parts and sets of links provided, while in the case of the 3TC44 it must be mounted and wired between the contactor poles. With types 3TC52/56, the series resistor must be attached separately next to the contactors. One NC of the auxiliary contacts is required for the series resistor function. The selection and ordering data show the number of additional, unassigned auxiliary contacts. It is not possible to extend the number of auxiliary contacts.

With the 3TC52 and larger contactors, the series resistor must be connected using an additional K2 reversing contactor (3RT13 17-1F.40). This contactor is automatically included in the delivery in the same packaging as the contactor.

All specifications and technical specifications not mentioned here are identical to those of the standard 3TC contactors.

Ambient temperature

The permissible ambient temperature for operation of the contactors (across the full coil operating range) is -50 to +70 °C. Uninterrupted duty at temperatures < -25 °C and > +55 °C reduces the mechanical endurance, the current-carrying capacity of the conducting paths and the operating frequency.

Installation

At ambient temperatures > 55 °C, a distance of 10 mm must be observed if contactor relays and size 1 and 2 contactors are mounted side by side. There is no need to reduce the technical specifications.

Dimensions

Attaching resistors and varistors increases the width of the contactors (see Dimensional drawings).

Technical specifications

Contactor	Type		3TC44	3TC48	3TC52	3TC56
Coil operating range			0.7 ... 1.25 x U_s			
Power input of the solenoids			For cold coil and 1.0 x U_s			
Closing		W	48	26	40	295
Closed		W	13	14	21	59

3TC Contactors for Switching DC Voltage

1- and 2-pole, 32 ... 400 A

Overview

3TC4 and 3TC5

EN 60947-4-1 (VDE 0660 Part 102).

The contactors are finger-safe according to EN 50274.

Terminal covers may have to be fitted onto the connecting bars, depending on the configuration with other devices.

The DC motor ratings given in the tables are applicable to the DC-3 and DC-5 utilization categories with two-pole switching of the load or with the two conducting paths of the contactor connected in series.

One contactor conducting path can switch full power up to 220 V. The ratings for higher voltages are available on request.

3TC7

EN 60947-4-1 (VDE 0660 Part 102).

The contactors are suitable for use in any climate. They are suitable for switching and controlling DC motors as well as all other DC loads. The electromagnetic excitation is designed for a particularly wide coil operating range.

It is between 0.7 or 0.8 to 1.2 × U_S.

3TC74 contactors can be used at up to 750 V/400 A and 50 Hz in AC-1 operation.

Application

The contactors are suitable for switching and controlling DC motors as well as all other DC circuits.

A version with an especially large operating range is available for operation in electrically driven vehicles and in switchgear with significant fluctuations in the actuating voltage (see page 3/123).

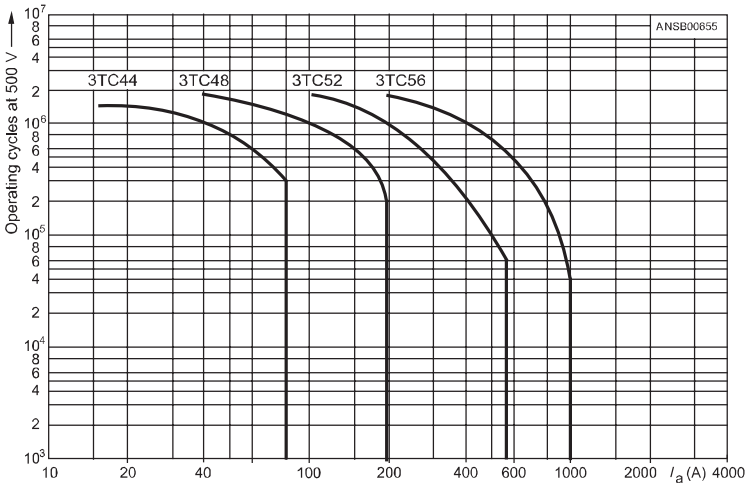
Technical specifications

Contactor	Type			3TC4 and 3TC7	3TC5
Rated data of the auxiliary contacts					
Rated insulation voltage U_i (pollution degree 3)			V	690	
Continuous thermal current I_{th} = Rated operational current I_e/AC-12				10	10
AC load **Rated operational current I_e/AC-15/AC-14** For rated operational voltage U_e					
		24 V	A	10	10
		110 V	A	10	10
		125 V	A	10	10
		220 V	A	6	6
		230 V	A	5.6	5.6
		380 V	A	4	4
		400 V	A	3.6	3.6
		500 V	A	2.5	2.5
		660 V	A	2.5	2.5
		690 V	A	--	--
DC load **Rated operational current I_e/DC-12** For rated operational voltage U_e					
		24 V	A	10	10
		60 V	A	10	10
		110 V	A	3.2	8
		125 V	A	2.5	6
		220 V	A	0.9	2
		440 V	A	0.33	0.6
		600 V	A	0.22	0.4
Rated operational current I_e/DC-13 For rated operational voltage U_e					
		24 V	A	10	10
		60 V	A	5	5
		110 V	A	1.14	2.4
		125 V	A	0.98	2.1
		220 V	A	0.48	1.1
		440 V	A	0.13	0.32
		600 V	A	0.07	0.21

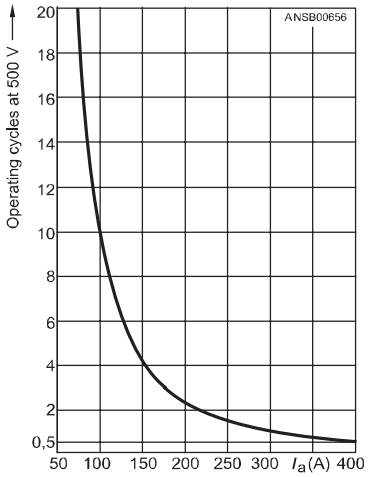
Contactor	Type			3TC44 ... 3TC56
CSA and UL rated data for the auxiliary contacts				
Rated voltage			AC V, max.	600
Switching capacity				A 600, P 600

Contactor	Type	3TC44 ... 3TC78

Endurance of the main contacts

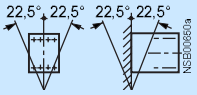


3TC44 to 3TC56 contactors



3TC74 and 3TC78 contactors

Legend for the diagrams:
I_a = Breaking current

Contactor	Type Size		3TC44 2	3TC48 4	3TC52 8	3TC56 12
General data						
Permissible mounting position The contactors are designed for operation on a vertical mounting surface.						
Mechanical endurance	Operating cycles		10 million			
Electrical endurance	Operating cycles		1)			
Rated insulation voltage U_i (pollution degree 3)		V	800		1000	
Safe isolation Between the coil and the contacts acc. to EN 60947-1, Appendix N		V	Up to 300		Up to 660	
Mirror contacts A mirror contact is an auxiliary NC contact that cannot be closed simultaneously with a NO main contact.			Yes. Acc. to EN 60947-4-1, Appendix F			
Permissible ambient temperature	During operation During storage	°C °C	-25 ... +55 -50 ... +80			
Degree of protection acc. to EN 60947-1, Appendix C			IP00/open, for AC operation, coil assembly IP40			
Shock resistance	Rectangular pulse	g/ms	7.5/5 and 3.4/10	10/5 and 5/10	12/5 and 5.5/10	12/5 and 5.6/10
Short-circuit protection						
Main circuit Fuse links gL/gG NH 3NA, DIAZED 5SB, NEOZED 5SE	 Type of coordination "1" Type of coordination "2"	 A A	 35 50	 63 160	 80 250	 250 400
Auxiliary circuit (short-circuit current $I_k \geq 1$kA)						
• Fuse links, gL/gG DIAZED 5SB, NEOZED 5SE		A	16			
• Miniature circuit-breaker with C-characteristic		A	10			

For the rated data of the auxiliary contacts see page 3/124.

1) See the endurance diagram above.

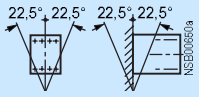
3TC Contactors for Switching DC Voltage

1- and 2-pole, 32 ... 400 A

Contactor	Type Size			3TC44 2	3TC48 4	3TC52 8	3TC56 12
Control							
Coil operating range				0.8 ... 1.1 x U_s			
Power input of the solenoids (for cold coil and 1.0 x U_s)							
DC operation	• Closing = Closed		W	10	19	30	86
AC operation, 50 Hz coil	• Closing • Closed		VA/p.f. VA/p.f.	68/0.86 10/0.29	300/0.5 26/0.24	640/0.48 46/0.23	1780/0.3 121/0.22
AC operation, 60 Hz coil	• Closing • Closed		VA/p.f. VA/p.f.	95/0.79 12/0.3	365/0.45 35/0.26	730/0.38 56/0.24	2140/0.3 140/0.29
AC operation, 50/60 Hz coil	• Closing at 50 Hz/60 Hz • Holding power at 50 Hz/60 Hz		VA/p.f. VA/p.f.	79/73/0.83/0.78 11/9/0.28/0.27	-- --	-- --	-- --
Operating times (at 0.8 ... 1.1 x U_s) Total break time = Opening delay + Arcing time				(the values apply up to and including 20 % undervoltage, 10 % overvoltage, as well as when the coil is cold and warm)			
• DC operation	Closing delay Opening delay[1]		ms ms	35 ... 190 10 ... 25	90 ... 380 17 ... 28	120 ... 400 22 ... 35	110 ... 400 40 ... 110
• AC operation	Closing delay Opening delay[1]		ms ms	10 ... 40 5 ... 25	20 ... 50 5 ... 30	20 ... 50 10 ... 30	20 ... 50 10 ... 30
• Arcing time	DC-1 DC-3/DC-5		ms ms	20 30			
Main circuit							
Load rating with DC							
Utilization category DC-1, switching resistive load (L/R ≤ 1 ms)							
Rated operational current I_e (at 55 °C)		up to U_e 750 V	A	32	75	220	400
Minimum conductor cross-section			mm^2	6	25	95	240
Power rating at U_e		at 220 V 440 V 600 V 750 V	kW kW kW kW	7 14 19.2 24	16.5 33 45 56	48 97 132 165	88 176 240 300
Utilization category DC-3 and DC-5 **Shunt-wound and series-wound motors** (L/R ≤ 15 ms)							
Rated operational current I_e (at 55 °C)		up to 220 V 440 V 600 V 750 V	A A A A	32 29 21 7.5	75 75 75 75	220 220 220 170	400 400 400 400
Power rating at U_e		at 110 V 220 V 440 V 600 V 750 V	kW kW kW kW kW	2.5 5 9 9 4	6.5 13 27 38 45	20 41 82 110 110	35 70 140 200 250
Operating frequency							
Operating frequency *z* in operating cycles/hour							
AC/DC operation	With resistive load DC-1 For inductive load DC-3/DC-5		h^{-1} h^{-1}	1500 750	1000 600		
Conductor cross-sections							
Screw terminal (1 or 2 conductors connectable)	**Main conductor:**						
	• Solid		mm^2	2 x (2.5 ... 10)	--	--	--
	• Finely stranded with end sleeve		mm^2	2 x (1.5 ... 4)	--	--	--
	• Stranded with cable lug		mm^2	--	2 x 35	2 x 120	2 x 150
	• Pin terminal to DIN 46231		mm^2	2 x (1 ... 6)	--	--	--
	• Busbars		mm	--	15 x 2.5	25 x 4	2 x (25 x 3)
	• Terminal screw			M5	M6	M10	M10
	Auxiliary conductors:						
	• Solid		mm^2	2 x (1 ... 2.5)			
	• Finely stranded with end sleeve		mm^2	2 x (0.75 ... 1.5)			

For the rated data of the auxiliary contacts see page 3/124.

1) The opening delay times can increase if the contactor coils are damped against voltage peaks. Only 3TC44 contactors are allowed to be fitted with diodes.

Contactor	Type			3TC74 1-pole contactors	3TC78 2-pole contactors
General data					
Permissible mounting position The contactors are designed for operation on a vertical mounting surface.					
Mechanical endurance	Operating cycles			30 million	
Electrical endurance	Operating cycles			1)	
Rated insulation voltage U_i (pollution degree 3)			V	1500	
Rated impulse withstand voltage U_{imp}			kV	8	
Safe isolation Between the coil and the contacts acc. to EN 60947-1, Appendix N			V	630	
Permissible ambient temperature			°C	-25 ... +55	
Degree of protection acc. to EN 60947-1 Appendix C				IP00/open	
Short-circuit protection					
Main circuit Fuse links, gL/gG NH 3NA	 Type of coordination "1" Type of coordination "2"		 A A	 630 500	
Auxiliary circuit short-circuit current $I_k \geq 1$ kA					
• Fuse links, gL/gG operational class DIAZED Type 5SB, NEOZED Type 5SE			A	16	
• Miniature circuit-breaker with C-characteristic			A	10	
Control					
Coil operating range					
DC operation		24 V > 24 V		0.8 ...1.2 x U_s 0.7 ...1.2 x U_s	
AC operation		24 V > 24 V		0.7 ...1.15 x U_s 0.7 ...1.2 x U_s	
Power consumption of the magnetic coils (when coil is cold and 1.0 x U_s)					
DC operation	Closing = Closed		W	46	92
AC operation, 50 Hz	Closing, Closed		VA	80/0.95	160/0.95
Operating times (Total break time = Opening delay + Arcing time)				(the values apply up to and including 15 % undervoltage, 10 % overvoltage, as well as when the coil is cold and warm)	
• AC and DC operation	Closing delay Opening delay		ms ms	60 ... 100 20 ... 35	
• Arcing time at 0.06 ... 4 x I_e			ms	40 ... 70	
Main circuit					
Load rating with DC					
Utilization category DC-1, switching resistive load (L/R ≤ 1 ms)					
Rated operational current I_e/DC-1 (at 55 °C)			A	500	500
Minimum conductor cross-section			mm^2	2 x 150	2 x 150
Rating at		220 V 440 V 600 V	kW kW kW	110 220 300	110 220 300
		750 V 1200 V 1500 V	kW kW kW	375 -- --	375 600 750
Critical currents, without arc extinction		440 V 600 V 750 V	A A A	≤ 7 ≤ 13 ≤ 15	-- -- --
		≤ 800 V 1200 V 1500 V	A A A	-- -- --	≤ 7 ≤ 13 ≤ 15
Utilization categories DC-3 and DC-5, switching DC motors				2)	
Permissible rated current for regenerative braking at 110 ... 600 V			A	400	
Operating frequency					
Operating frequency *z* in operating cycles/hour					
AC/DC operation	With resistive load DC-1 For inductive load DC-3/DC-5		h^{-1} h^{-1}	750 500	1000 500
Conductor cross-section					
Screw terminal	**Main conductor:** • Stranded with cable lug • Busbars		 mm^2 mm	 2 x ... 150 2 x (30 x 4)	
	Auxiliary conductors: • Solid • Finely stranded with end sleeve		 mm^2 mm^2	 1 ... 2.5 0.75 ... 1.5	

For the rated data of the auxiliary contacts see page 3/124.

1) See page 3/125.

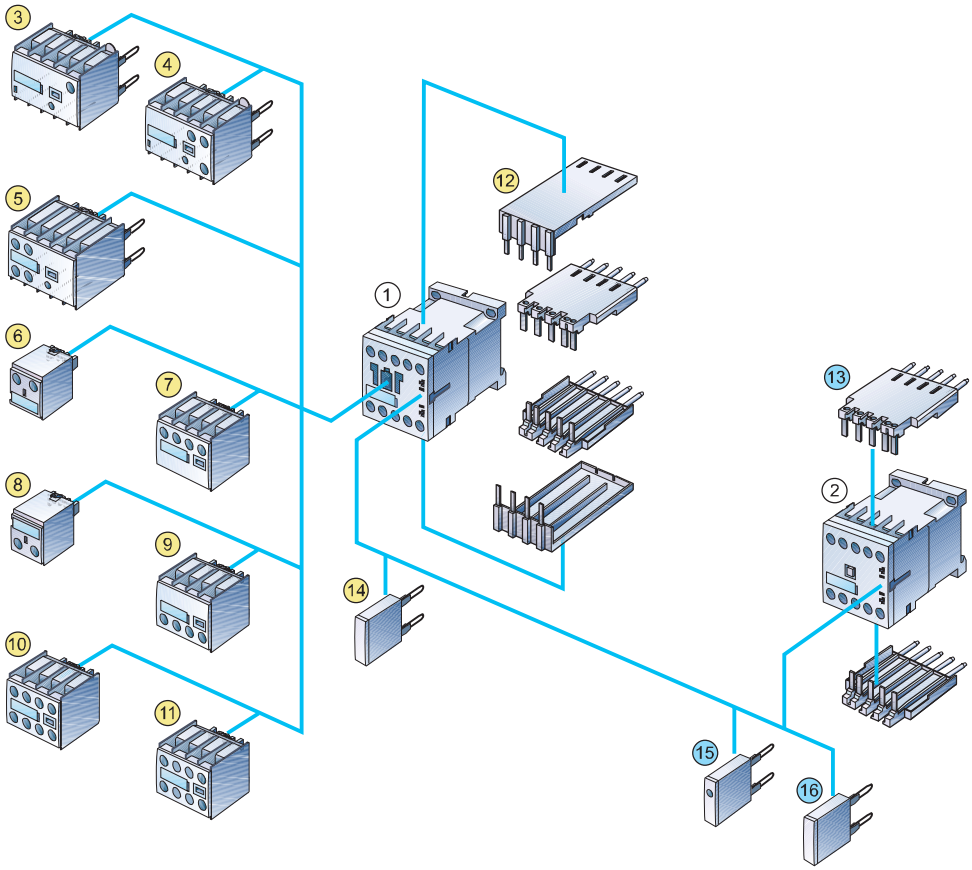
2) See selection table in Catalog LV 1.

3RH1 contactor relays, 4- and 8-pole

Overview

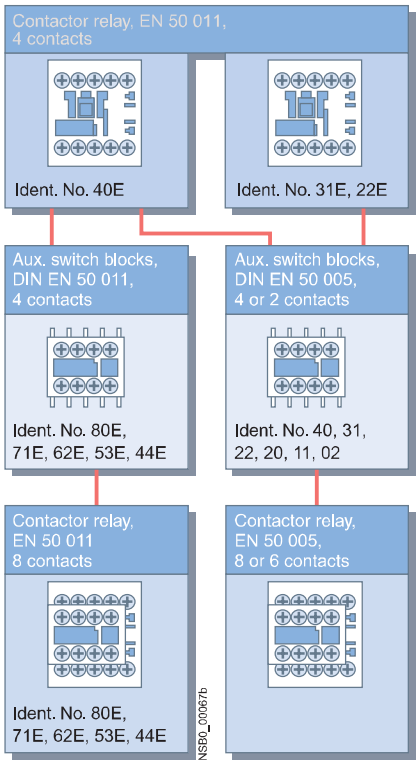
The SIRIUS generation of controls is a complete, modular system family, logically designed right down to the last detail, from the basic units to the accessories.

Contactor relays and coupling relays
Size S00 with accessories



1 Contactor relay
2 Coupling relay for auxiliary circuits
3 Solid-state time-delay block with ON-delay
4 Solid-state time-delay block with OFF-delay
5 Auxiliary switch block, solid-state time-delay (versions: ON or OFF-delay)
6 1-pole auxiliary switch block, cable entry from above
7 2-pole auxiliary switch block, cable entry from above
8 1-pole auxiliary switch block, cable entry from below
9 2-pole auxiliary switch block, cable entry from below
10 4-pole auxiliary switch block (terminal designation according to EN 50011 or EN 50005)
11 2-pole auxiliary switch block, standard version or solid-state compatible version terminal designations according to EN 50005)
12 Solder pin adapter for contactor relays with 4-pole auxiliary switch block
13 Solder pin adapter for contactor relays and coupling relays
14 Additional load module for increasing the permissible residual current
15 Surge suppressor with LED
16 Surge suppressor without LED

3RH1 contactor relays, 4- and 8-pole



AC and DC operation

IEC 60947, EN 60947 (VDE 0660)

The 3RH1 contactor relays are suitable for use in any climate. They are finger-safe according to EN 50274.

The 3RH1 contactor relays have screw or Cage Clamp terminals. Four contacts are available in the basic unit.

Function

Contact reliability

High contact stability at low voltages and currents, suitable for solid-state circuits with currents ≥ 1 mA at a voltage of 17 V.

Overvoltage damping

RC elements, varistors, diodes or diode assemblies (combination of a diode and a Zener diode) can be plugged onto all contactor relays from the front for damping opening surges in the coil. The plug-in direction is determined by a coding device.

Note:
The OFF-delay times of the NO contacts and the ON-delay times of the NC contacts increase if the contactor coils are damped against voltage peaks (noise suppression diode 6 to 10 times; diode assemblies 2 to 6 times, varistor +2 to 5 ms).

Integration

Auxiliary switch blocks

The 3RH1 contactor relays can be expanded by up to four contacts by the addition of mountable auxiliary switch blocks.

The auxiliary switch block can easily be snapped onto the front of the contactors. The auxiliary switch block has a centrally positioned release lever for disassembly.

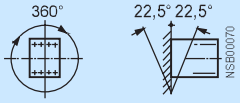
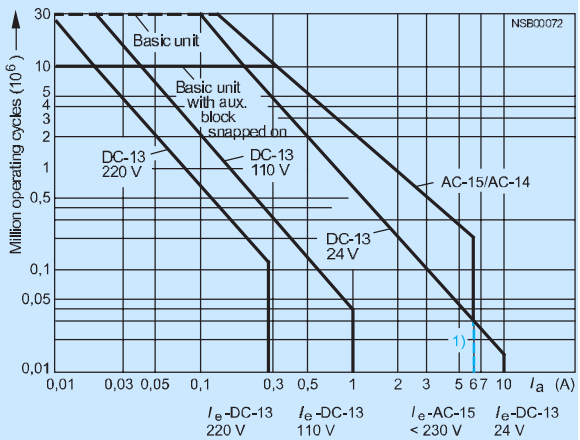
The contactor relays with 4 contacts according to EN 50011, with the identification number 40E, can be extended with 80E to 44E auxiliary switch blocks to obtain contactor relays with 8 contacts according to EN 50011. The identification numbers 80E to 44E on the auxiliary switch blocks apply to the complete contactors. These auxiliary switch blocks (3RH19 11–1GA ..) cannot be combined with contactor relays with identification numbers 31E and 22E; they are coded.

All contactor relays with 4 contacts according to EN 50011, identification numbers 40E to 22E, can be extended with auxiliary switch blocks 40 to 02 to obtain contactor relays with 6 or 8 contacts in accordance with EN 50005. The identification numbers on the auxiliary switch blocks apply only to the attached auxiliary switch blocks.

In addition, fully mounted 3RH12 8-pole contactor relays are available; the mounted 4-pole auxiliary switch block is not removable.
The terminal designations comply with EN 50011. These versions are built in accordance with special Swiss regulations (SUVA) and are distinguished externally by a red identification plate.

3RH1 contactor relays, 4- and 8-pole

Technical specifications

Contactor	Type Size	**3RH1** **S00**
Permissible mounting position		
The contactors are designed for operation on a vertical mounting surface.	AC and DC operation	
Upright mounting position (only for 3RH11/3RH12/3RH14)	AC operation	 Special version required
	DC operation	Standard version (for coupling relays and contactor relays with extended tolerance 3RH11 22-2K.40, please ask)
Positively-driven operation of contacts in contactor relays		
3RH1: **Yes,** in the basic unit and the auxiliary switch block as well as between the basic unit and the snap-on auxiliary switch block (removable) acc. to: • ZH 1/457 • EN 60947-5-1, Appendix L **3RH12:** **Yes,** in the basic unit and the auxiliary switch block as well as between the basic unit and the snap-on auxiliary switch block (fixed) acc. to: • ZH 1/457 • EN 60947-5-1, Appendix L • SUVA Note *3RH19 11-.NF solid-state compatible auxiliary switch blocks have no positively-driven contacts.*		Explanations: There is positively-driven operation if it is ensured that the NC and NO contacts cannot be closed at the same time. **ZH1/457** Safety rules for control units on power-operated presses in the metal-working industry. **EN 60947-5-1, Appendix L** Low-voltage controlgear, control equipment, and switching elements. Special requirements for positively-driven contacts **SUVA** Accident prevention regulations of the Schweizer Unfallverhütungsanstalt (Swiss Institute for Accident Insurance)
Contact reliability		
Contact reliability at 17 V, 1 mA acc. to EN 60947-5-4		Frequency of contact faults < 10^{-8}, i.e. < 1 fault per 100 million operating cycles
Contact endurance for AC-15/AC-14 and DC-13 utilization categories		
The contact endurance is mainly dependent on the breaking current. It is assumed that the operating mechanisms are switched randomly, i.e. not synchronized with the phase angle of the supply system. If magnetic circuits other than the contactor coil systems or solenoid valves are present, e.g. magnetic brakes, protective measures for the load circuits are necessary. RC elements and freewheel diodes would be suitable as protective features. The characteristic curves apply to: • 3RH11, 3RH12 contactor relays • 3RH14 latched contactor relays • 3RH19 11 auxiliary switch blocks.		 Diagram legend: I_a = Breaking current I_e = Rated operational current

1) Snap-on auxiliary switch blocks: I_e/DC-13 max. 6 A.

Contactor	Type		3RH11, 3RH12	3RH14
	Size		S00	S00
CSA and UL rated data				
Basic units and auxiliary switch blocks				
• Rated control supply voltage		V AC	Max. 600	
• Rated voltage		V AC	600	
• Switching capacity			A 600, Q 600	
• Uninterrupted current at AC 240 V		A	10	
General data				
Mechanical endurance	Basic units	Operating cycles	30 million	5 million
	Basic unit with snap-on auxiliary switch block	Operating cycles	10 million	
	Solid-state compatible auxiliary switch block	Operating cycles	5 million	
Rated insulation voltage U_i (pollution degree 3)		V	690	
Rated impulse withstand voltage U_{imp}		kV	6	
Safe isolation Between the coil and the contacts in the basic unit acc. to EN 60947-1, Appendix N		V	400	
Permissible ambient temperature	During operation	°C	-25 ... +60	
	During storage	°C	-55 ... +80	
Degree of protection acc. to EN 60947-1, Appendix C			IP20, coil assembly IP40	
Touch protection acc. to EN 50274			Finger-safe	
Shock resistance				
Rectangular pulse	AC/DC operation	g/ms	10/5 and 5/10	
Sine pulse	AC/DC operation	g/ms	15/5 and 8/10	
Conductor cross-sections				
Screw terminals	**Auxiliary conductor and coil terminals**			
(1 or 2 conductors connectable)	• Solid	mm^2	2 x (0.5 ... 1.5); 2 x (0.75 ... 2.5) acc. to IEC 60947; max. 2 x (1 ... 4)	
	• Finely stranded with end sleeve	mm^2	2 x (0.5 ... 1.5); 2 x (0.75 ... 2.5)	
	• AWG conductors, solid or stranded	AWG	2 x (20 ... 16); 2 x (18 ... 14); 1 x 12	
	• Terminal screws		M3	
	- Tightening torque	Nm	0.8 ... 1.2 (7 ... 10.3 lb.in)	
Cage Clamp terminals	**Auxiliary conductor and coil terminals**			
(1 or 2 conductors connectable)	• Solid	mm^2	2 x (0.25 ... 2.5)	
	• Finely stranded with end sleeve	mm^2	2 x (0.25 ... 1.5)	
	• Finely stranded without end sleeve	mm^2	2 x (0.25 ... 2.5)	
	• AWG conductors, solid or stranded	AWG	2 x (24 ... 14)	
Short-circuit protection				
(weld-free protection at $I_k \geq 1$ kA)				
• Fuse links, gL/gG operational class				
- DIAZED, Type 5SB		A	10	
- NEOZED Type 5SE		A	10	
• or miniature circuit-breakers with C-characteristic (short-circuit current $I_k < 400$ A)		A	6	

For corresponding 8WA2 803/8WA2 804 opening tool, see Catalog LV 1.
An "insulation stop" must be used for conductor cross-sections ≤ 1 mm^2, see Catalog LV 1.
Maximum outer diameter of the conductor insulation: 3.6 mm.

3RH1 contactor relays, 4- and 8-pole

Contactor	Type Size		3RH1. S00
Control			
Coil operating range			
AC operation	at 50 Hz at 60 Hz		0.8 ... 1.1 x U_s 0.85 ... 1.1 x U_s
DC operation	at +50 °C at +60 °C		0.8 ... 1.1 x U_s 0.85 ... 1.1 x U_s
Power consumption of the magnetic coils (when coil is cold and 1.0 x U_s)			
AC operation, 50 Hz	• Closing • Closed	VA/p.f. VA/p.f.	27 /0.8 4.6 /0.27
AC operation, 60 Hz	• Closing • Closed	VA/p.f. VA/p.f.	24 /0.75 3.5 /0.27
DC operation	Closing = Closed	W	3.2
Permissible residual current of the electronics (with 0 signal)			
	For AC operation[1] For DC operation		< 3 mA x (230 V/U_s) < 10 mA x (24 V/U_s)
Operating times[2] (Total break time = OFF-delay + Arcing time)			
AC operation	Values apply with coil in cold state and at operating temperature for operating range		
Closing			
• ON-delay of NO contact	0.8 ... 1.1 x U_s 1.0 x U_s 3RH14 minimum operating time	ms ms ms	8 ... 35 10 ... 25 ≥ 35
• OFF-delay of NC contact	0.8 ... 1.1 x U_s 1.0 x U_s	ms ms	6 ... 20 7 ... 20
Opening			
• OFF-delay of NO contact	0.8 ... 1.1 x U_s 1.0 x U_s 3RH14 minimum operating time	ms ms ms	4 ... 30 5 ... 30 ≥ 30
• ON-delay of NC contact	0.8 ... 1.1 x U_s 1.0 x U_s	ms ms	5 ... 30 7 ... 20
DC operation			
Closing			
• ON-delay of NO contact	0.8 ... 1.1 x U_s 1.0 x U_s 3RH14 minimum operating time	ms ms ms	25 ... 100 30 ... 50 ≥ 100
• OFF-delay of NC contact	0.8 ... 1.1 x U_s 1.0 x U_s	ms ms	20 ... 90 25 ... 45
Opening			
• OFF-delay of NO contact	0.8 ... 1.1 x U_s 1.0 x U_s 3RH14 minimum operating time	ms ms ms	7 ... 10 7 ... 9 ≥ 30
• ON-delay of NC contact	0.8 ... 1.1 x U_s 1.0 x U_s	ms ms	13 ... 16 13 ... 15
Arcing time		ms	10 ... 15

Dependence of the operating frequency z' on the operational current I' and operational voltage U'

$z' = z \cdot I_e/I' \cdot (U_e/U')^{1.5} \cdot 1/h$

1) The 3RT19 16-1GA00 additional load module is recommended for higher residual currents, see Catalog LV 1.

2) The opening delay of the NO contact and the closing delay of the NC contact are increased if the contactor coils are attenuated against voltage peaks (noise suppression diode 6 to 10 times; diode assemblies 2 to 6 times, varistor +2 to 5 ms).

Contactor	Type Size			3RH1. S00
Load side				
Rated operational currents I_e				
AC-12			A	10
AC-15/AC-14 For rated operational voltage U_s		up to 230 V 400 V 500 V 690 V	A A A A	6 3 2 1
DC-12 For rated operational voltage U_s				
• 1 current path		24 V 60 V 110 V 220 V 440 V 600 V	A A A A A A	10 6 3 1 0.3 0.15
• 2 current paths in series		24 V 60 V 110 V 220 V 440 V 600 V	A A A A A A	10 10 4 2 1.3 0.65
• 3 current paths in series		24 V 60 V 110 V 220 V 440 V 600 V	A A A A A A	10 10 10 3.6 2.5 1.8
DC-13 For rated operational voltage U_s				
• 1 current path		24 V 60 V 110 V 220 V 440 V 600 V	A A A A A A	10[1)] 2 1 0.3 0.14 0.1
• 2 current paths in series		24 V 60 V 110 V 220 V 440 V 600 V	A A A A A A	10 3.5 1.3 0.9 0.2 0.1
• 3 current paths in series		24 V 60 V 110 V 220 V 440 V 600 V	A A A A A A	10 4.7 3 1.2 0.5 0.26
Operating frequency z				
• In operating cycles/h during normal duty for utilization category		AC-12/DC-12 AC-15/AC-14 DC-13	h^{-1} h^{-1} h^{-1}	1000 1000 1000
• No-load operating frequency			h^{-1}	10000

Dependence of the operating frequency z' on the operational current I' and operational voltage U'

$z' = z \cdot I_e/I' \cdot (U_e/U')^{1.5} \cdot 1/h$

1) Snap-on auxiliary switch blocks: 6 A.

3RH14 latched contactor relays, 4-pole

Overview

AC and DC operation

IEC 60947, EN 60947 (VDE 0660)

The terminal designations comply with EN 50011.

The contactor coil and the coil of the release solenoid are both designed for continuous duty.

The number of auxiliary contacts can be extended by means of auxiliary switch blocks (up to 4 poles).

RC elements, varistors, diodes or diode assemblies can be fitted to both coils from the front for damping opening surges in the coil.

The contactor relay can also be switched on and released manually. (For minimum actuating times, see page 3/132)

3TH4 contactor relays, 8- and 10-pole

Overview

AC and DC operation

IEC 60947 and EN 60947 (VDE 0660)

The 3TH42/3TH43 contactor relays are suitable for use in any climate. They are finger-safe according to EN 50274.

Terminal designations according to EN 50011

In terms of their terminal designations, identification numbers and identification letters, the 3TH42/3TH43 contactor relays conform to the standard EN 50011 for "Specific contactor relays".

Function

Contact reliability

High contact stability at low voltages and currents thanks to the use of moving double-break contacts, suitable for solid-state circuits with currents ≥1 mA for voltages at 17 V.

Make-before-break contacting

The 3TH42/3TH43 contactor relays are available in versions with make-before-break contacting (make-before-break between 1 NO and 1 NC).

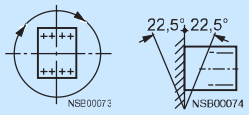
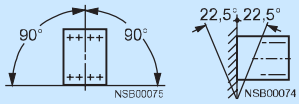
The make-before-break time is approximately 1 ms. This is not sufficient to cause another contactor to close. If the make-before-break current paths are connected in series, a fleeting contact element is created; the wiping time is approximately 1 ms.

Overvoltage damping

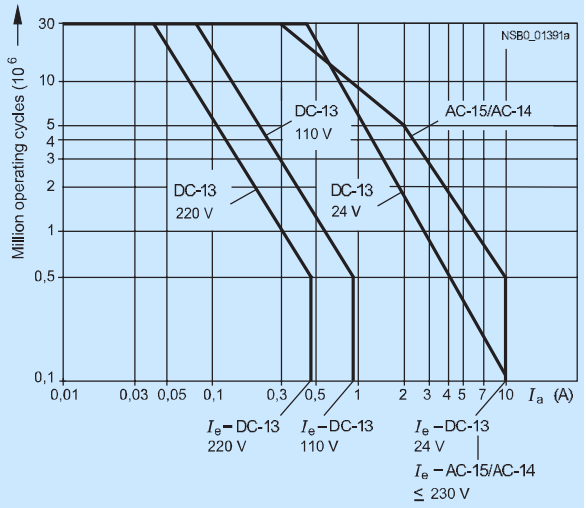
The 3TH42/3TH43 contactors can be equipped with RC elements, varistors, diodes or diode assemblies (combination of a diode and a Zener diode) for damping opening surges. The surge suppressors can be mounted directly on the coil (see accessories).

Note:
The OFF-delay times of the NO contacts and the ON-delay times of the NC contacts increase if the contactor coils are damped against voltage peaks (noise suppression diode 6 to 10 times; diode assembly 2 to 6 times, varistor +2 to 5 ms).

Technical specifications

Contactor	Type	3TH42/3TH43
Permissible mounting positions		
The contactors are designed for operation on a vertical mounting surface.	AC operation	
	DC operation	
Upright mounting position	AC and DC operation	 Special version required
Positively-driven operation in contactor relays with 8 and 10 contacts		
3TH42/3TH43: **Yes,** the contactor relays comply with the conditions for positively-driven operation acc. to: • ZH 1/457 • EN 60947-5-1, Appendix L • SUVA		Explanations: There is positively-driven operation if it is ensured that the NC and NO contacts cannot be closed at the same time. **ZH1/457** Safety rules for control units on power-operated presses in the metal-working industry. **EN 60947-5-1, Appendix L** Low-voltage controlgear, control equipment, and switching elements. Special requirements for positively-driven contacts **SUVA** Accident prevention regulations of the "Schweizer Unfallverhütungs-anstalt" (Swiss Institute for Accident Insurance)

3TH4 contactor relays, 8- and 10-pole

Contactor	Type		3TH42/3TH43
Contact endurance for AC-15/AC-14 and DC-13 utilization categories			
The contact endurance is mainly dependent on the breaking current. t is assumed that the operating mechanisms are switched randomly, i.e. not synchronized with the phase angle of the supply system. If magnetic circuits other than the contactor coil systems or solenoid valves are present, e.g. magnetic brakes, protective measures for the load circuits are necessary. RC elements and freewheel diodes would be suitable as protective features.			 Legend: I_a = Breaking current I_e = Rated operational current
CSA and UL rated data			
Basic units			
Rated control supply voltage U_S			Max. 600 V AC, 230 V DC (to UL 240 V DC)
Rated voltage **Switching capacity**			600 V AC, 600 V DC A 600, P 600
General data			
Mechanical endurance	Basic units	Oper-ating cycles	30 million
Rated insulation voltage U_i (pollution degree 3)		V	690
Rated impulse withstand voltage U_{imp}		kV	8
Safe isolation Between the coil and the contacts acc. to EN 60947-1, Appendix N		V	Up to 500
Permissible ambient temperature	During operation During storage	°C °C	-25 ... +55 -55 ... +80
Degree of protection acc. to EN 60947-1, Appendix C			IP20
Shock resistance			
Rectangular pulse	AC operation DC operation	g/ms g/ms	7.7/5 and 4.4/10 9.3/5 and 5.4/10
Sine pulse	AC operation DC operation	g/ms g/ms	12/5 and 6.8/10 14.7/5 and 8.5/10
Conductor cross-sections			
Screw terminal Solid Finely stranded with end sleeve		 mm^2 mm^2	M3.5 2 x (0.5 ... 1); 2 x (1 ... 2.5); 1 x 4 2 x (0.75 ... 2.5)
Short-circuit protection			
(weld-free protection at $I_k \geq 1$ kA)			
• Fuse links, gL/gG operational class	NH Type 3NA DIAZED Type 5SB NEOZED Type 5SE, quick	A A A	16 16 20
• Miniature circuit-breakers	Characteristic C Characteristic B	A A	16 16

Contactor	Type		3TH42/3TH43
Control			
Coil operating range			
AC operation			0.8 ... 1.1 x U_s [1]
DC operation (except 24 V)			0.8 ... 1.1 x U_s
• At 24 V DC			0.8 ... 1.2 x U_s
Power consumption of the magnetic coils (when coil is cold and 1.0 x U_s)			
AC operation, 50 Hz, standard version			
• Closing		VA/p.f.	68 /0.82
• Closed		VA/p.f.	10 /0.29
AC operation, 50/60 Hz, standard version			
• Closing, 50 Hz		VA/p.f.	77 /0.81
• Closed, 50 Hz		VA/p.f.	11 /0.28
• Closing, 60 Hz		VA/p.f.	71 /0.75
• Closed, 60 Hz		VA/p.f.	9 /0.27
AC operation, 50 Hz, USA/Canada			
• Closing		VA/p.f.	68 /0.82
• Closed		VA/p.f.	10 /0.29
AC operation, 60 Hz, USA/Canada			
• Closing		VA/p.f.	75 /0.76
• Closed		VA/p.f.	9.4 /0.29 ... 0.3
AC operation, 50 Hz, Japan			
• Closing		VA/p.f.	80 /0.8
• Closed		VA/p.f.	10.7 /0.29
AC operation, 60 Hz, Japan			
• Closing		VA/p.f.	75 ... 90 /0.73
• Closed		VA/p.f.	8.5 ... 10.7 /0.29 ... 0.3
DC operation up to 250 V	Closing = Closed	W	6.2
Permissible residual current of the electronics (with 0 signal)			
For AC operation			≤ 8 mA x (220 V/U_s)
For DC operation			≤ 1.25 mA x (220 V/U_s)
Operating times [2] Total break time = Opening time + Arcing time (the values apply up to and including 20 % undervoltage, 10 % overvoltage, and with the coil in the cold state and at operating temperature)			
AC operation			
Closing			
• ON-delay NO contact		ms	8 ... 35
• Opening time NC		ms	6 ... 20
Opening			
• OFF-delay NO contact		ms	4 ... 18
• ON-delay NC		ms	5 ... 30
Arcing time		ms	10
DC operation			
Closing			
• ON-delay NO contact		ms	20 ... 170
• OFF-delay NC		ms	18 ... 110
Opening			
• OFF-delay NO contact		ms	10 ... 25
• ON-delay NC		ms	15 ... 30
Arcing time		ms	10
Operating times [2] **at 1.0 x U_s**			
AC operation			
Closing			
• ON-delay NO contact		ms	10 ... 25
• Opening time NC		ms	7 ... 20
Opening			
• OFF-delay NO contact		ms	5 ... 18
• Closing time NC		ms	7 ... 20
DC operation			
Closing			
• ON-delay NO contact		ms	30 ... 70
• Opening time NC		ms	28 ... 65
Opening			
• OFF-delay NO contact		ms	10 ... 20
• Closing time NC		ms	15 ... 25

1) Coils for USA, Canada and Japan: 0.85 ... 1.1 U_s at 60 Hz.

2) The opening delay of the NO contact and the closing delay of the NC contact are increased if the contactor coils are attenuated against voltage peaks (noise suppression diode 6 to 9 times; diode assemblies 2 to 6 times, varistor +2 to 5 ms).

3TH4 contactor relays, 8- and 10-pole

Contactor	Type			3TH42/3TH43
Load side				
Rated operational currents I_e				
AC-12			A	16
AC-15/AC-14 for rated operational voltage U_e				
		230 V	A	10
		400 V	A	6
		500 V	A	4
		690 V	A	2
DC-12, for rated operational voltage U_e				
• 1 current path		up to 48 V	A	10
		110 V	A	2.1
		220 V	A	0.8
		440 V	A	0.6
		600 V	A	0.6
• 2 current paths in series				
		up to 48 V	A	10
		110 V	A	10
		220 V	A	1.6
		440 V	A	0.8
		600 V	A	0.7
• 3 current paths in series				
		up to 48 V	A	10
		110 V	A	10
		220 V	A	10
		440 V	A	1.3
		600 V	A	1
DC-13, for rated operational voltage U_e				
• 1 current path				
		24 V	A	10
		48 V	A	5
		110 V	A	1
		220 V	A	0.45
		440 V	A	0.25
		600 V	A	0.2
• 2 current paths in series				
		24 V	A	10
		48 V	A	10
		110 V	A	2.5
		220 V	A	0.75
		440 V	A	0.5
		600 V	A	0.4
• 3 current paths in series				
		24 V	A	10
		48 V	A	10
		110 V	A	10
		220 V	A	2
		440 V	A	0.9
		600 V	A	0.8
Rated output power of induction motors Acc. to utilization category AC-2 and AC-3, 50 Hz				
		230/220 V	kW	2.4
		400/380 V	kW	4
		500 V	kW	4
		690/660 V	kW	4
Operating frequency z[1]				
Operating cycles per hour during normal duty for utilization category		AC-12/DC-12	h^{-1}	1000
		AC-2	h^{-1}	500
		AC-3	h^{-1}	1000
		AC-15/AC-14	h^{-1}	3600
		DC-13	h^{-1}	3600
		No-load operating frequency	h^{-1}	10000

1) Dependence of the operating frequency z' on the operational current I' and operational voltage U': $z' = z \cdot I_e/I' \cdot (U_e/U')^{1.5} \cdot 1/h$.

Overview

AC and DC operation

IEC 60947 (VDE 0660).

3TH2 contactor relays

The 3TH2 contactor relays are suitable for use in any climate. The contactor relays with screw terminal are finger-safe according to EN 50274.

3TH27 latched contactor relays

The terminal designations comply with EN 50011.

The contactor coil and the coil of the release solenoid are both designed for continuous duty.

RC elements, varistors, diodes or diode assemblies can be fitted to both coils from the front for damping opening surges in the coil.

The contactor relay can also be switched on and released manually.

Design

3TH2 contactor relays

Version

The 3TH20 contactors with 4 auxiliary contacts are available with SIGUT screw terminals, 6.3 mm x 0.8 mm flat connectors and solder pin connectors.

The contactors with 6.3 mm x 0.8 mm flat connectors can be used in the plug-in socket with solder pin connectors for printed circuit boards. The contactor relays are coded and the plug-in socket is codable in order to ensure non-interchangeability.

The 3TH22 contactor relays with 8 integrated contacts are available with screw terminals. The terminal designations are according to EN 50011.

Contact reliability

High contact stability at low voltages and currents, suitable for solid-state circuits with currents ≥ 1 mA at a voltage of 17 V and higher.

Auxiliary switch blocks

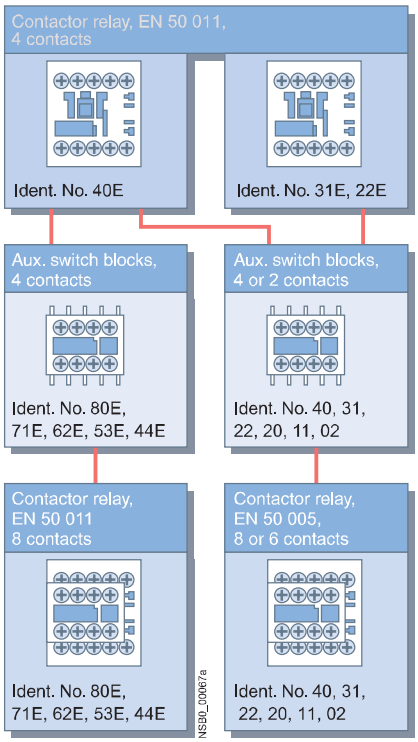
The contactor relays with 4 contacts with screw terminals relays can be expanded by up to four contacts by the addition of mountable auxiliary switch blocks.

A cover (with device identification plate) must be removed from the front of the contactor for this purpose. The auxiliary switch block is then easy to mount. The auxiliary switch blocks can be removed again by unlocking them with a laterally arranged slide.

The contactor relays with screw terminals with 4 contacts according to EN 50011, with the identification number 40E, can be extended with 80E, 71E, 62E, 53E or 44E auxiliary switch blocks to obtain contactor relays with 8 contacts according to EN 50011. The identification numbers 80E, 71E, 62E, 53E or 44E on the coded auxiliary switch blocks apply to the complete contactors (see illustration on the right). These auxiliary switch blocks cannot be combined with contactor relays with identification number 31E and 33E.

All contactor relays with screw terminals with 4 contacts according to EN 50011, identification number 40E, 31E or 22E, can be extended with auxiliary switch blocks with identification number 40, 31, 22, 20, 11 or 02 to obtain contactor relays with 6 or 8 contacts according to EN 50005. The identification numbers on the auxiliary switch blocks apply only to the attached auxiliary switch blocks (see the illustration on the right).

3TH20..-0 contactor relays
Terminal designations according to EN 50011 and EN 50005



Overvoltage damping

RC elements, varistors, diodes or diode assemblies (combination of a diode and a Zener diode for short break times) can be plugged onto all contactors and auxiliary switch blocks with screw terminals from the front in order to damp opening surges in the coil. The device identification plate must be removed for this purpose.

It can be snapped onto the attached surge suppressor.

Residual current

The 3TX4 490-1J additional load module (see Accessories) can be used by programmable logic controllers to increase the permissible residual current and to limit the residual voltage of semiconductor outputs.

This module ensures the safe opening of 3TH2/3TF2 contactors with direct control through 230 V AC semiconductor outputs. It is accommodated in the same enclosure as the 3TX4 490-3. surge suppressors and can be plugged into the contactor.

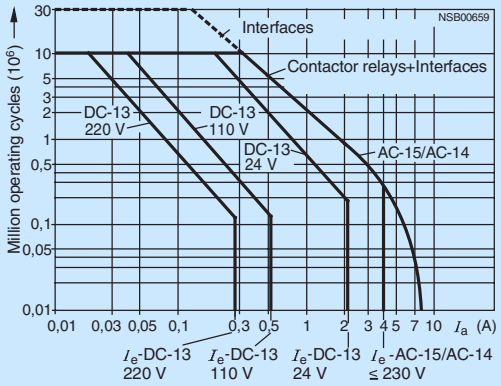
3TH2 contactor relays, 4- and 8-pole

Technical specifications

Contactor relays	Type	3TH2

Contact endurance for AC-15/AC-14 and DC-13 utilization categories

The contact endurance is mainly dependent on the breaking current. It is assumed that the operating mechanisms are switched randomly, i.e. not synchronized with the phase angle of the supply system.
If magnetic circuits other than the contactor coil systems or solenoid valves are present, e.g. magnetic brakes, protective measures for the load circuits are necessary. RC elements and freewheel diodes would be suitable as protective features.
Legend for the diagrams:
I_e = Rated operational current
I_a = Breaking current



Type			Contactor relays 3TH20 ..-....	3TH22 ..-....	Auxiliary contact block 3TX4 ...-..
General data					
Permissible mounting position	AC and DC operation		Any		
Mechanical endurance	AC operation	Operating cycles	10 million		
	DC operation	Operating cycles	30 million		
Rated insulation voltage U_i (pollution degree 3)					
• Screw terminal		V	690	500	500
• Flat connector 6.3 mm x 0.8 mm		V	500	--	--
• Solder pin connection		V	500	--	--
Rated impulse withstand voltage U_{imp} (pollution degree 3)					
• Screw terminal		kV	8	6	6
• Flat connector 6.3 mm x 0.8 mm		kV	6	--	--
• Solder pin connection		kV	6	--	--
Safe isolation between coil and contacts (acc. to DIN VDE 0106 Part 101 and A1 [draft 02/89])		V	Up to 300		
Positively-driven operation of contacts in contactor relays					
3TH20: **Yes,** in the basic unit and the auxiliary switch block as well as between the basic unit and the snap-on auxiliary switch block (removable) acc. to: • ZH 1/457 • EN 60947-5-1, Appendix L **3TH22:** **Yes,** in the basic unit and the auxiliary switch block as well as between the basic unit and the snap-on auxiliary switch block (fixed) acc. to: • ZH 1/457 • EN 60947-5-1, Appendix L • SUVA			Explanations: There is positively-driven operation if it is ensured that the NC and NO contacts cannot be closed at the same time. **ZH1/457** Safety rules for control units on power-operated presses in the metal-working industry. **EN 60947-5-1, Appendix L** Low-voltage controlgear, control equipment, and switching elements. Special requirements for positively-driven contacts **SUVA** Accident prevention regulations of the Schweizer Unfallverhütungsanstalt (Swiss Institute for Accident Insurance)		
Permissible ambient temperature[1]	During operation	°C	-25 ... +55		
	During storage	°C	-55 ... +80		
Degree of protection acc. to EN 60947-1 Appendix C			IP00 open IP20 for screw terminal IP40 coil assembly		
Touch protection acc. to EN 50274			Finger-safe for screw terminal		
Resistance to shock					
Rectangular pulse	AC operation	g/ms	7/5 and 4/10		
	DC operation	g/ms	10/5 and 6/10		
Sine pulse	AC operation	g/ms	9/5 and 6/10		
	DC operation	g/ms	13/5 and 8/10		
Conductor cross-sections			[2]		

1) Applies to 50/60 Hz coil:
Operating range at 60 Hz: 0.85 ... 1.1 x U_s;
at 50 Hz, 1.1 x U_s, side-by-side mounting and 100% ON period
the max. ambient temperature is +40 °C.

2) See page 3/142.

Contactor relays	Type			3TH2
Short-circuit protection				
Short-circuit protection				
Fuse-links gL/gG NH 3NA, DIAZED 5SB, NEOZED 5SE			A	6
Weld-free protection at $I_k \geq 1$ kA				
Control				
Coil operating range[1]				0.8 ... 1.1 x U_s
Power consumption of the magnetic coils (when coil is cold and 1.0 x U_s)				
AC operation, 50 Hz	• Closing		VA	15
	• p.f.			0.41
	• Closed		VA	6.8
	• p.f.			0.42
AC operation, 60 Hz	• Closing		VA	14.4
	• p.f.			0.36
	• Closed		VA	6.1
	• p.f.			0.46
AC operation, 50/60 Hz[1]	• Closing		VA	16.5/13.2
	• p.f.			0.43/0.38
	• Closed		VA	8.0/5.4
	• p.f.			0.48/0.42
DC operation	Closing = Closed		W	3
Permissible residual current of the electronics (with 0 signal)				
	AC operation		mA	≤3 x (220 V/U_s)
	DC operation		mA	≤1 x (220 V/U_s)
Operating times at 0.8 ... 1.1 x U_s[2] Total break time = Opening delay + Arcing time Values apply with coil in cold state and at operating temperature for operating range				
• AC operation	ON-delay		ms	5 ... 20
	OFF-delay		ms	4 ... 12
	ON-delay		ms	3 ... 24
	OFF-delay		ms	3 ... 20
• DC operation	ON-delay		ms	16 ... 140
	OFF-delay		ms	13 ... 40
	ON-delay		ms	3 ... 6
	OFF-delay		ms	4 ... 10
Arcing time			ms	10
Operating times at 1.0 x U_s[2]				
• AC operation	ON-delay		ms	6 ... 17
	OFF-delay		ms	5 ... 12
	ON-delay		ms	3 ... 24
	OFF-delay		ms	5 ... 20
• DC operation	ON-delay		ms	18 ... 42
	OFF-delay		ms	15 ... 26
	ON-delay		ms	3 ... 5
	OFF-delay		ms	4 ... 10
Main circuit				
AC capacity				
Utilization category AC-12 Rated operational current I_e (at 60 °C)			A	10
Utilization category AC-15 and AC-14 Rated operational current I_e for rated operational voltage U_e				
		230/220 V	A	4
		400/380 V	A	3
		500 V	A	2
		690/660 V	A	1

1) Applies to 50/60 Hz coil:
Operating range at 60 Hz: 0.85 ... 1.1 x U_s;
at 50 Hz, 1.1 x U_s, side-by-side mounting and 100% ON period the max. ambient temperature is +40 °C.

2) The opening delay of the NO contact and the closing delay of the NC contact are increased if the contactor coils are attenuated against voltage peaks (noise suppression diode 6 to 10 times; diode assemblies 2 to 6 times, varistor +2 to 5 ms).

3TH2 contactor relays, 4- and 8-pole

Contactor relays	Type			3TH2
Main circuit				
Load rating with DC				
Utilization category DC-12 Rated operational current I_e for rated operational voltage U_e			A	10
• 1 current path[1]		up to 24 V	A	4
		60 V	A	2
		110 V	A	1.1
		240/220 V	A	0.5
• 2 current paths in series		up to 24 V	A	10
		60 V	A	10
		110 V	A	4
		240/220 V	A	2
• 3 current paths in series		up to 24 V	A	10
		60 V	A	10
		110 V	A	6
		240/220 V	A	2.5
Utilization category DC-13 Rated operational current I_e for rated operational voltage U_e				
• 1 current path		up to 24 V	A	2.1
		60 V	A	0.9
		110 V	A	0.52
		240/220 V	A	0.27
• 2 current paths in series		up to 24 V	A	10
		60 V	A	3.5
		110 V	A	1.3
		240/220 V	A	0.9
• 3 current paths in series		up to 24 V	A	10
		60 V	A	4.7
		110 V	A	3
		240/220 V	A	1.2
Operating frequency				
Operating frequency z in operating cycles/hour Rated operation for utilization category				
Dependence of the operating frequency z' on the operational current I' and operational voltage U'	AC-12/DC-12		h^{-1}	1000
$z' = z \cdot (I_e/I') \cdot (400\ V/U')^{1.5} \cdot 1/h$	AC-2		h^{-1}	500
	AC-3		h^{-1}	1000
	AC-15/AC-14		h^{-1}	1200
	DC-13		h^{-1}	1200
No-load operating frequency			h^{-1}	10000
Conductor cross-sections				
Screw terminal	**Main and auxiliary conductors**			
	Solid		mm^2	2 x (0.5 ... 2.5)
	Finely stranded with end sleeve		mm^2	2 x (0.5 ... 1.5)
	• Terminal screw			M3
Flat connector				
	Finely stranded			
When using a quick-connect terminal	• 6.3 ... 1		mm^2	0.5 ... 1
	• 6.3 ... 2.5		mm^2	1 ... 2.5
Solder pin connection				Only for printed circuit boards
Rated output power of induction motors				
acc. to utilization category AC-2 and AC-3	110 V		kW	0.2
	230/220 V		kW	0.55
	400/380 V		kW	1.1
	500 V		kW	1.5
	690/660 V		kW	1.5

1) Contact endurance 0.1 x 10^6 operating cycles.

3RH11 coupling relays for switching auxiliary circuits, 4-pole

Application

DC operation

IEC 60947 and EN 60947 (VDE 0660)

The 3RH11 coupling relays for switching auxiliary circuits are tailored to the special requirements of working with electronic controls.

Function

No auxiliary switch blocks can be snapped onto 3RH11 coupling relays.

Coupling relays have a low power consumption, an extended coil operating range and an integrated surge suppressor for damping opening surges (exceptions: 3RH11 ..-.HB40 and 3RH11 ..-.MB4.-0KT0).

Technical specifications

All technical specifications not mentioned in the table below are identical to those of the 3RH11 contactor relays. (See page 3/130)
The size S00 coupling relays (3RH11) cannot be extended with auxiliary switch blocks.

Contactor type Size		**3RH11 ..-.HB40** S00	**3RH11 ..-.JB40** S00	**3RH11 ..-.KB40** S00
Coil operating range		0.7 ... 1.25 x U_s		
Power consumption of the magnetic coil (for cold coil) Closing = closed				
At U_s = 17 V	W	1.2		
At U_s = 24 V	W	2.3		
At U_s = 30 V	W	3.6		
Permissible residual current of the electronics for 0 signal		< 10 mA x (24 V/U_s)		
Overvoltage configuration of the magnetic coil		No surge suppression 	With diode 	With varistor 
Operating times				
• **Closing** at 17 V				
- ON-delay NO	ms	40 ... 120		
- OFF-delay NC	ms	30 ... 70		
• At 24 V				
- ON-delay NO	ms	30 ... 60		
- OFF-delay NC	ms	20 ... 40		
• At 30 V				
- ON-delay NO	ms	20 ... 50		
- OFF-delay NC	ms	15 ... 30		
• **Opening** at 17... 30 V				
- OFF-delay NO contact	ms	7 ... 17	40 ... 60	7 ... 17
- Closing time NC	ms	22 ... 30	60 ... 70	22 ... 30
Upright mounting position		Request required		

Contactor type Size		**3RH11 ..-.MB40-0KT0** S00	**3RH11 ..-.VB40** S00	**3RH11 ..-.WB40** S00
Coil operating range		0.85 ... 1.85 x U_s		
Power consumption of the magnetic coil (for cold coil) Closing = Closed at U_s = 24 V	W	1.4		
Permissible residual current of the electronics for 0 signal		< 8 mA x (24 V/U_s)		
Overvoltage configuration of the magnetic coil		Diode, varistor or RC element, attachable 	Built-in diode 	Built-in varistor 
Switching times of the coupling relays				
• Closing at 20.5 V				
- ON-delay	ms	30 ... 120		
- OFF delay	ms	20 ... 110		
• At 24 V				
- ON-delay NO	ms	25 ... 90		
- OFF-delay NC	ms	15 ... 80		
• At 44 V				
- ON-delay	ms	15 ... 60		
- OFF delay	ms	10 ... 50		
• Opening at 17 ... 30 V				
- OFF-delay NO	ms	5 ... 20	20 ... 80	5 ... 20
- ON-delay NC	ms	10 ... 30	30 ... 90	10 ... 30
Upright mounting position		Request required		

3RT10 coupling relays (interface), 3-pole, 3 ... 11 kW

Application

DC operation

IEC 60947, EN 60947 (VDE 0660)

The 3RT10 coupling relays for switching motors are tailored to the special requirements of working with electronic controls.

Function

Coupling relays have a low power consumption, an extended coil operating range and an integrated surge suppressor for damping opening surges (exceptions: 3RT10 1.–1HB4. and 3RT10 1.–.MB4.-0KT0).

Technical specifications

All technical specifications not mentioned in the table below are identical to those of the 3RT10 contactors for switching motors. (See page 3/17)
The 3RT10 1 coupling relays cannot be extended with auxiliary switch blocks.
Two single-pole auxiliary switch blocks can be fitted to the 3RT10 2 coupling relays (see Accessories).

Contactor	Type Size			**3RT10 1.-.HB4. S00**	**3RT10 1.-.JB4. S00**	**3RT10 1.-.KB4. S00**	**3RT10 2.-.KB4. S0**
Mechanical endurance			Operating cycles	30 million			10 million
Coil voltage operating range				0.7 ... 1.25 x U_s			
Power consumption of the magnetic coil (for cold coil) Closing = Closed		at U_s 17 V 24 V 30 V	W W W	1,2 2,3 3,6			2,1 4,2 6,6
Permissible residual current of the electronics (for 0 signal)				< 10 mA x (24 V/U_s)			< 6 mA x (24 V/U_s)
Overvoltage configuration of the magnetic coil				No surge suppression	With diode	With varistor *U*	With varistor *U*
Switching times of the coupling relays							
• Closing							
- at 17 V	ON-delay NO OFF-delay NC		ms ms	40 ... 120 30 ... 70			93 ... 270 83 ... 250
- at 24 V	ON-delay NO OFF-delay NC		ms ms	30 ... 60 20 ... 40			64 ... 87 55 ... 78
- at 30 V	ON-delay NO OFF-delay NC		ms ms	20 ... 50 15 ... 30			53 ... 64 45 ... 56
• Opening at 17... 30 V	OFF-delay NO ON-delay NC		ms ms	7 ... 17 22 ... 30	40 ... 60 60 ... 70	7 ... 17 22 ... 30	18 ... 19 24 ... 25
Safe isolation Between the coil and the contacts acc. to EN 60947-1, Appendix N			V	400			

3RT10 coupling relays (interface), 3-pole, 3 ... 11 kW

All technical specifications not mentioned in the table below are identical to those of the 3RT10 contactors for switching motors. (See page 3/17)
The 3RT10 1 coupling relays cannot be extended with auxiliary switch blocks.
Power consumption of the coils 1.4 W at 24 V.

Contactor	Type Size			3RT10 1.-1MB4.-0KT0 S00	3RT10 1.-1VB4. S00	3RT10 1.-1WB4. S00
Mechanical endurance			Oper-ating cycles	30 million		
Coil operating range				0.85 ... 1.85 x U_s		
Power consumption of the magnetic coil (for cold coil) Closing = Closed		at U_s 24 V	W	1,4		
Overvoltage configuration of the magnetic coil				No surge suppression	With diode	With varistor *U*
Operating times of the coupling relays						
• Closing						
- at 20.5 V	ON-delay NO OFF-delay NC		ms ms	40 ... 130 40 ... 125		
- at 24 V	ON-delay NO OFF-delay NC		ms ms	40 ... 100 30 ... 90		
- at 44 V	ON-delay NO OFF-delay NC		ms ms	20 ... 30 15 ... 25		
• Opening	OFF-delay NO ON-delay NC		ms ms	9 ... 12 12 ... 16	45 ... 65 52 ... 72	10 ... 15 15 ... 20
Safe isolation Between the coil and the contacts acc. to EN 60947-1, Appendix N			V	400		
Permissible residual current **Upright mounting position**				On request		

3TX7 Coupling Relays, Narrow Design

Relay couplers

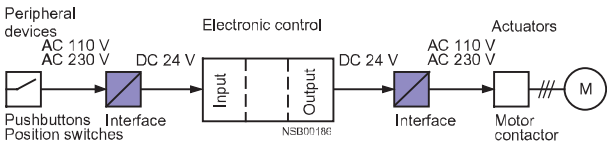
Design

Note on mounting

Snap-on mounting is possible on horizontal and vertical rails. In the case of vertical rails and closely mounted units, the maximum permissible ambient temperature T_u = 40 °C. Any service position is possible.

If the coupling links are operated continuously 24 hours per day (100% ON time) at the maximum permissible rated control supply voltage and the maximum permissible ambient temperature, it is recommended that no similar equipment or other units that generate heat are placed directly adjoining the coupling links because this can reduce the endurance of the couplers.

A distance > 10 mm to the right and left of the coupling link reduces the risk of a premature failure under these conditions of application.



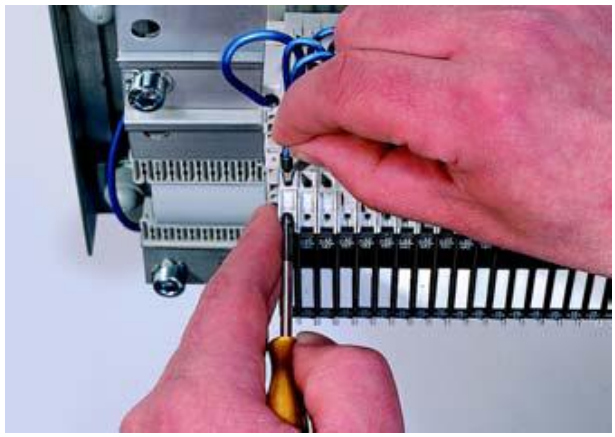
Function

Overvoltage damping

The coupling links have been tested with 1 x 10^5 operating cycles at AC-15 operation with the values specified in the Technical specifications.

If inductive loads are connected in parallel, the endurance of the relay couplers can be increased.

Note: If capacitive loads without series resistors are switched, which limit temporary peak currents, microscopic welding of the relay contacts may result.



Connecting a lead to the spring-loaded terminals

Technical specifications

Type			3TX7 002/3TX7 003
General data			
Rated insulation voltage U_i (pollution degree 3)		V	300
Safe isolation for relay couplers[1] Between the coil and the contacts acc. to EN 60947-1, Appendix N		V	Up to AC 300
Degree of protection	Connections for relay couplers Enclosures		IP20 IP30
Short-circuit protection acc. to IEC 60947-5-1 (weld-free protection at $I_k \geq 1$ kA) Fuse inserts, gL/gG operational class		A	4
Permissible ambient temperature	During operation During storage	°C °C	-25 ... +60 -40 ... +80
Conductor cross-sections			
• Screw terminals			
- Solid		mm^2	1 x (0.25 ... 4)
- Finely stranded with or without end sleeve		mm^2	1 x (0.5 ... 2.5)
- Terminal screw			M3
• Spring-loaded terminals (for 3TX7 003):			
- Solid or finely stranded		mm^2	1 x (0.08 ... 2.5)
- Finely stranded with end sleeve		mm^2	1 x (0.25 ... 1.5)

1) For 3TX7 00.-1FB02, no safe isolation according to DIN VDE 0106 Part 101.

Type	3TX7 002-/3TX7 003-		1AB02	1AB00	1BB00	1FB02	1CB00	2AB00	2AE00	1BF00 2BF02	2AF00	2AF05
Control side												
Operating range			0.8 ... 1.25 x U_s						0.8 ... 1.1 x U_s			
Power consumption at U_s		W	0.75	0.75	0.75	1.2	1.2	0.75	0.75	1.2	1.2	1.2
Release voltage		%	≥ 10									≥ 25
Max. permissible conductor length (min. cross-section: 0.75 mm²)	AC DC	m m	300 2.000	300	300	300	300	300	15	7	7	350
• **Permissible residual current** of the electronics (for 0 signal)		mA	2	2	2	2	4	2	0.4	0.35	0.35	4
Operating times at U_s	ON-delay OFF-delay	ms ms	< 8 < 10									
Function display			Yellow LED									

Type			3TX7 002/3TX7 003
Load side			
Rated current[1]			
• Continuous thermal current I_{th}		A	6
• Rated operational currents I_e			
Acc. to utilization categories (DIN VDE 0660) (3TX7 002-1CB00: AC-15, I_e = 2 A)			
AC-15	- at 24 V	A	3
	- at 110 V	A	3
	- at 230 V	A	3
DC-13	- at 24 V	A	1
	- at 110 V	A	0.2
	- at 230 V	A	0.1
Switching current With resistive load to DIN VDE 0435 (relay standard) and DIN VDE 0660			
AC-12	- at 24 V	A	6
	- at 110 V	A	6
	- at 230 V	A	6
DC-12	- at 24 V	A	6
	- at 110 V	A	0.2
	- at 230 V	A	0.2
Switching voltage	AC/DC	V	24 ... 250
• **Min. contact load for 3TX7 00.-...02**		mA	1 V AC/DC, 0.1
Mechanical endurance		Operating cycles	20 x 10^6
Electrical endurance at I_e		Operating cycles	1 x 10^5
Operating frequency		Operating cycles 1/h	5000
Contact material for 3TX7 00.-...02			Ag/Ni 0.15 hard gold-plated
Power limit hard gold plating for 3TX7 00.-...02			
• Voltage		V	30
• Current		mA	20

Note: If inductive loads are connected, the endurance of the relay couplers can be increased.

1) Capacitive loads can result in micro-weldings on the contacts.

3TX7 Coupling Relays, Narrow Design

Relay couplers

Type			3TX7 004/3TX7 005
General data			
Rated insulation voltage U_i (pollution degree 3)		V	300
Safe isolation for relay couplers Between the coil and the contacts acc. to EN 60947-1, Appendix N		V	Up to 300 AC
Degree of protection	Connections Enclosures		IP20 IP30
Short-circuit protection acc. to IEC 60947-5-1 (weld-free protection at $I_k \geq 1$ kA) Fuse inserts, gL/gG operational class		A	4
Permissible ambient temperature	During operation During storage	°C °C	-25 ... +60 -40 ... +80
Conductor cross-sections			
• Screw terminals (for 3TX7 004): - Solid - Finely stranded with end sleeve - Finely stranded without end sleeve - Terminal screws		 mm^2 mm^2 mm^2	 1 x (0.25 ... 4) 1 x (0.5 ... 2.5) 1 x (0.5 ... 2.5) M3
• Spring-loaded terminals (for 3TX7 005): - Solid or finely stranded - Finely stranded with end sleeve		 mm^2 mm^2	 1 x (0.08 ... 2.5) 1 x (0.25 ... 1.5)
Control side			
Operating range	at U_S = 24 V AC/DC at U_S = 110 V and 230 V AC/DC		0.7 ... 1.25 x U_S 0.8 ... 1.1 x U_S
Power consumption at U_S			0.5 W; 3TX7 00.-...05: 1 W at 230 V DC/6 VA at 230 V AC
Permissible residual current of the electronics (for 0 signal) - Width 6.2 mm - U_S = 24 V - U_S > 24 V - From 12.5 mm width Exceptions: 3TX7 00 .-1BF05		 mA mA mA mA mA	 2 0.5 2.5 5 (U_S = 230 V AC) 0.5 (U_S = 230 V DC)
Operating times at U_S			
	ON-delay OFF-delay	ms ms	< 8 < 15
Function display			Yellow LED

Type	3TX7 004/3TX7 005		-1.F00 -2ME02 -2MF02	-1.B.. -2MB02	-1BF05
Max. permissible conductor length (min. conductor cross-section: 0.75 mm^2)					
	AC	m	40	400	350
	DC	m	2000	2000	2000

Type			3TX7 00.-1A/-1B/-1C/-1G/-1H	3TX7 00.-.M
Load side				
Rated operational current I_e [1]				
• Continuous thermal current I_{th}		A	6	
Rated operational current I_e acc. to utilization categories (DIN VDE 0660)				
AC-15	- at 24 V	A	3	2
	- at 110 V	A	3	2
	- at 230 V	A	3	2
DC-13	- at 24 V	A	1	
	- at 110 V	A	0.2	
	- at 230 V	A	0.1	
Switching current				
With resistive load to DIN VDE 0435 (relay standard) and DIN VDE 0660				
AC-12	- at 24 V	A	6	
	- at 110 V	A	6	
	- at 230 V	A	6	
DC-12	- at 24 V	A	6	
	- at 110 V	A	0.3	
	- at 230 V	A	0.2	
Power limit for hard gold plating	Voltage	V	30	
	Current	mA	20	
Switching voltage	AC/DC	V	17 ... 250	
Endurance	Mechanical	Operating cycles	20 x 10^6	
	Electrical (at I_e)	Operating cycles	1 x 10^6	0.5 x 10^6
Operating frequency		Operating cycles 1/h	5000	

Note: If inductive loads are connected, the endurance of the relay couplers can be increased.

1) Capacitive loads can result in micro-weldings on the contacts.

3TX7 Coupling Relays, Narrow Design

Relay couplers with plug-in design

Design

Coupling elements are used to connect signals to and from a PLC. The plug-in relays enable the relay to be replaced at the end of its service life without detaching the wiring.

For easy linking of the signals, each terminal can be jumpered using an external connecting comb.

Technical specifications

Type			3TX7 01.-1
General data			
Rated insulation voltage U_i (pollution degree 2)		V	300
Safe isolation Between the coil and the contacts acc. to EN 60947-1, Appendix N		V	Up to 300 AC
Degree of protection	Enclosures Relays		IP20 IP40
Short-circuit protection acc. to IEC 60947-5-1 (weld-free protection at $I_k \geq 1$ kA) Fuse inserts, gL/gG operational class		A	4
Permissible ambient temperature	During operation During storage	°C °C	-25 ... +55 -40 ... +80
Conductor cross-sections screw terminals • Solid • Finely stranded with or without end sleeve • Terminal screw		 mm^2 mm^2	 1 x (0.5 ... 2.5) 1 x (0.5 ... 1.5) M2.5

Type			3TX7 01.-1.H	3TX7 01.-1.B	3TX7 01.-1.E	3TX7 01.-1.F
Control side						
Operating range			0.9 ... 1.1 U_s	0.7 ... 1.25 U_s	0.8 ... 1.1 U_s	0.8 ... 1.1 U_s
Power consumption at U_s (24 V/115 V/230 V)		W	< 0.5/0.5/1			
Release voltage		%	10 of U_s			
Max. permissible conductor length (min. conductor cross-section: 0.75 mm)						
	AC	m	--	100	70	40
	DC	m	2000	2000	800	800
Permissible residual current of the electronics (for 0 signal)		mA	1	2	0.3	0.3
Operating times at U_s						
	ON-delay	ms	< 6	< 7	< 8	< 8
	OFF-delay	ms	< 6	< 7	< 20	< 20
Function display			Yellow LED			
Protection circuit						
	DC		Freewheel diode + Reverse polarity protection			
	AC		Rectifier bridge			

Type			3TX7 01.-1
Load side			
Rated current[1]			
• Continuous thermal current I_{th}		A	5
• Rated operational currents I_e			
- AC-15	at 24 V	A	3
	at 110 V	A	3
	at 230 V	A	3
- DC-13	at 24 V	A	1
	at 110 V	A	0.2
	at 230 V	A	0.1
Switching voltage	AC/DC	V	24 ... 250
Min. contact load • Standard contact • Hard gold-plated contacts			 17 V DC/5 mA at 1 ppm fault[2] 5 V DC/1 mA at 1 ppm fault[2]
Mechanical endurance		Operating cycles	20×10^6
Electrical endurance at I_e Acc. to AC-15		Operating cycles	100000
Operating frequency		Operating cycles 1/h	5000

Note: If inductive loads are connected, the endurance of the relay couplers can be increased.

1) Capacitive loads can result in micro-weldings on the contacts.

2) 1 ppm = one fault in the first one million operating cycles.

Overview

AC and DC operation

DIN VDE 0110 Part 1, DIN VDE 0435, DIN VDE 0660 and EN 50005 optocouplers: DIN VDE 0884, DIN VDE 0411 Part 500, IEC 61131-2 (programmable logic controllers).

In the coupling links in double-decker format, the connections are arranged on two levels; the units are extremely compact. Connection system: screw terminal or spring-loaded terminals. For test purposes, versions are available with manual 0 automatic switches.

The input and output coupling links differ with regard to the positioning of the terminals and the LEDs. For equipment identification purposes, each coupling link has a blank legend plate.

In accordance with the technical specifications of electronic systems, the coupling elements have a lower power consumption.

Design

Note on mounting

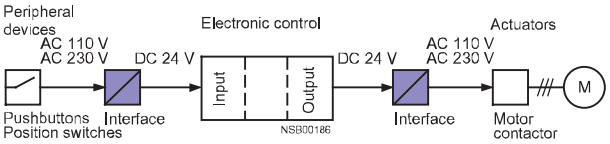
Snap-on mounting is possible on horizontal and vertical rails. In the case of vertical rails and closely mounted units, the maximum permissible ambient temperature T_u = 40 °C. Any service position is possible.

If the coupling elements are operated continuously 24 hours per day (100% ON time) at the maximum permissible rated control supply voltage and the maximum permissible ambient temperature, it is recommended that no similar equipment or other units that generate heat are placed directly adjoining the coupling elements because this can reduce the endurance of the couplers.

A distance > 10 mm to the right and left of the coupling element reduces the risk of a premature failure under these conditions of application.

Optocouplers switch using semiconductors. These are not subject to wear; welding is not possible.

The 6.2 mm wide optocouplers have an opening in the right-hand side of the casing. They can, like relay couplers, be mounted side-by-side without gaps.

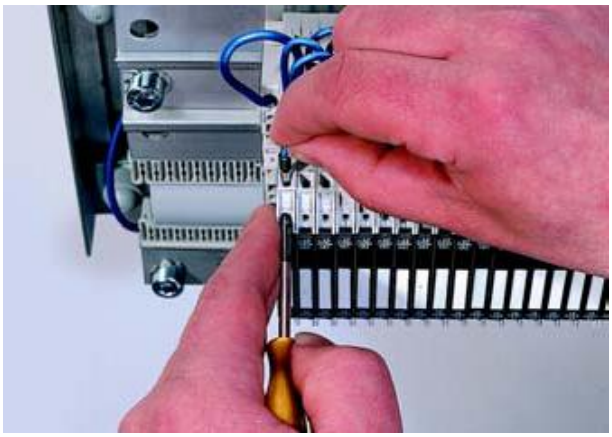


Function

Overvoltage damping

In the case of optocouplers, the contact element is a semiconductor. These are not subject to wear; so welding is not possible.

Note: With semiconductors, the switching current is not dependent on the inductance of the load, i.e. the switching current for a DC-13 load is the same as that for an inductive DC-12 load. This means that coupling elements with a semiconductor output are particularly suitable for inductive loads such as solenoid valves. It is not relevant to specify the number of operating cycles because this does not affect the endurance of the semiconductor provided it is not overheated.



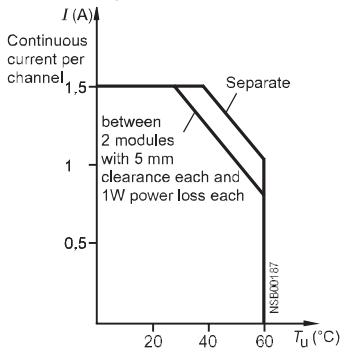
Connecting a lead to the spring-loaded terminals

3TX7 Coupling Relays, Narrow Design

Semiconductor couplers

Technical specifications

Type			3TX7 004-1.F.5
General data			
Derating diagram for 3TX7 002-3AB01 load current depending on the ambient temperature T_u			
Rated insulation voltage U_i (pollution degree 3)		V	300
Optoelectronic coupling element for safe isolation Acc. to EN 60947-1, Appendix N		V	Up to 300
Conductor cross-sections			
Solid		mm^2	1 x (0.25 ... 4)
Finely stranded with or without end sleeve		mm^2	1 x (0.5 ... 2.5)
Terminal screws			M3
Permissible ambient temperature			
During operation		°C	-25 ... +60
During storage		°C	-40 ... +80



Type	3TX7 002-		3AB00	3AB01	4AB00	4AG00
Control side						
Operating range		V	17 ... 30 DC	11 ... 30 DC	17 ... 30 AC/DC	88 ... 264 AC/DC
Control side power consumption						
	at 17 V DC	mA	< 18	< 5	--	--
	at 24 V DC	mA	< 20	< 7	--	--
	at 30 V DC	mA	< 22	< 8.5	--	--
	at 17 V AC/DC	mA	--	--	< 10	--
	at 24 V AC/DC	mA	--	--	< 14	--
	at 30 V AC/DC	mA	--	--	< 18	--
	at 88 V AC	mA	--	--	--	< 9
	at 230 V AC	mA	--	--	--	< 24
	at 264 V AC	mA	--	--	--	< 28
Release voltage		V	> 5	> 8	> 5	> 40
Operating times						
• ON-delay	at 17 V DC	ms	< 10	< 0.1	1	--
	at 24 V DC	ms	< 10	< 0.1	1	--
	at 30 V DC	ms	< 10	< 0.1	1	--
	at 17 V AC/DC	ms	--	--	< 1	--
	at 24 V AC/DC	ms	--	--	< 1	--
	at 30 V AC/DC	ms	--	--	< 1	--
	at 88 V AC	ms	--	--	--	< 18
	at 230 V AC	ms	--	--	--	< 20
	at 264 V AC	ms	--	--	--	< 22
• OFF-delay	at 17 V DC	ms	< 10	< 0.1	< 18	--
	at 24 V DC	ms	< 10	< 0.1	< 25	--
	at 30 V DC	ms	< 10	< 0.1	< 30	--
	at 17 V AC/DC	ms	--	--	< 18	--
	at 24 V AC/DC	ms	--	--	< 25	--
	at 30 V AC/DC	ms	--	--	< 30	--
	at 88 V AC	ms	--	--	--	< 10
	at 230 V AC	ms	--	--	--	< 20
	at 264 V AC	ms	--	--	--	< 25
Function display			Yellow LED	Yellow LED	Yellow LED	Yellow LED
Max. permissible conductor length (min. conductor cross-section: 0.75 mm^2)	AC	m	--	--	1000	140
	DC	m	2000	2000	2000	--
Load side						
Switching current		A	1.8	1.5 (see derating diagram)	0.1	0.1
Short-time loading capacity		A	20	4	1	1
		ms	20	200	20	20
Contacts			1 NO, Triac	1 NO, transistor	1 NO, transistor	1 NO, transistor
Switching voltage[1] (operating range)	Effective AC 50/60 Hz	V	48 ... 264	--	--	--
	DC		--	≤ 60	≤ 30	≤ 30
Minimum load current		mA	60	--	--	--
Voltage drop conducting		V	≤ 1.5	≤ 1.1	≤ 1.7	≤ 0.3
Permissible residual current of the electronics (with 0 signal)		mA	< 5	< 0.1	< 0.1	< 0.001
Operating frequency at I_e		Hz	1	1	5	5

1) Observe minimum operational voltage for 3TX7 002-3AB00.

Type		3TX7 004/3TX7 005
General data		
Rated insulation voltage U_i (pollution degree 3)	V	300
Safe isolation acc. to EN 60947-1, Appendix N for optocouplers	V	Up to 300
Permissible ambient temperature		
• During operation	°C	-25 ... +60
• During storage	°C	-40 ... +80
Conductor cross-sections		
• Screw terminals (for 3TX7 004):		
- Solid	mm^2	1 x (0.25 ... 4)
- Finely stranded with end sleeve	mm^2	1 x (0.5 ... 2.5)
- Finely stranded without end sleeve	mm^2	1 x (0.5 ... 2.5)
- Terminal screws		M3
• Spring-loaded terminals (for 3TX7 005):		
- Solid or finely stranded	mm^2	1 x (0.08 ... 2.5)
- Finely stranded with end sleeve	mm^2	1 x (0.25 ... 1.5)

Type	3TX7 004-/3TX7 005-		3AB04	3AC.4	3AC03	3PB54	4PG24
Control side							
Operating range		V	11 ... 30 DC				110 ... 230 AC/DC
Power consumption							
	- at 24 V DC	W	≤ 0.5	≤ 0.5	≤ 0.25	≤ 0.2	--
	- at 230 V AC	W	--	--	--	--	≤ 1.5
Release voltage		V	6	5	6	9	20
Permissible residual current of the electronics (for 0 signal)		mA	2.3	2.6	1.5	1.5	0.4
Operating times							
	- ON-delay	ms	2.5	0.3	10	0.3	10
	- OFF-delay	ms	8	4	10	0.3	12
Function display			Yellow LED				
Max. permissible conductor length (min. conductor cross-section: 0.75 mm^2)		m	1700	2000	2000	2000	40
Load side							
Switching voltage		V	≤ 48 DC	≤ 30 DC	24 ... 250 AC	≤ 30 DC	≤ 30 DC
Switching current		A	0.5	5	2	1.5	0.1
Short-time loading capacity							
		A	1.5	Short-circuit resistant[1]	100	Short-circuit resistant[2]	0.2
		ms	20	--	20	--	3
Contacts			1 NO, transistor		1 NO, Triac	1 NO, transistor	
Minimum load current		mA	--	500[3]	50	--	--
Voltage drop conducting		V	≤ 1	≤ 0.5	≤ 1.6	≤ 0.5	≤ 1.5
Leakage current of the electronics for 0 signal		mA	< 0.1	< 0.1	< 6	< 0.1	< 0.1
Operating frequency for resistive load		Hz	50	50	1	500	25

1) In the event of a short-circuit or overload, the semiconductor output switches off. In order to operate the device again, it must be temporarily disconnected from the power supply.

2) In the event of a short-circuit or overload, the current is limited by the semiconductor output.

3) If the current falls below the minimum load current, the built-in semiconductor detects an open-circuit in the load circuit. The control must be temporarily switched off for resetting.

3TX7 Coupling Relays, Narrow Design

Semiconductor couplers

Type	3TX7 004-/3TX7 005-		3PB74	3PG74
Control side				
Operating range		V	11 ... 30 DC	88 ... 253 AC/DC
Power consumption				
	- at 24 V DC	W	--	0.2
	- at 230 V AC	W	≤ 1.5	
Release voltage		V	25	
Permissible residual current of the electronics (for 0 signal)		mA	1.5	1.2
Operating times				
	- ON-delay	ms	1.5	--
	- OFF-delay	ms	75	--
Function display			Yellow LED	
Max. permissible conductor length (min. conductor cross-section: 0.75 mm^2)		m	40	
Load side				
Switching voltage max.		V	30 DC	
Switching current		A	3	
Short-time loading capacity		A	Short-circuit resistant[1)]	
		ms	--	
Contacts			1 NO, transistor	
Minimum load current		mA	--	
Voltage drop conducting		V	≤ 0.5	
Leakage current of the electronics for 0 signal		mA	0.1	
Operating frequency for resistive load		1/s	10	

1) In the event of a short-circuit or overload, the current is limited by the semiconductor output.

Overview

The new 3RS18 coupling relays are couplers in the well-proven standard 22.5 mm timing relay enclosure. The series comprises relays with 1, 2 and 3 changeover contacts with screw and spring-loaded terminals for combined voltages and wide voltage ranges.

Application

Typical applications are found wherever electronically optimized contacts are required and equipment with a wide voltage range is implemented.

Technical specifications

Type			3RS18 ..-....0	3RS18 ..-....1
General data				
Rated insulation voltage U_i (pollution degree 3)		V	500	
Safe isolation acc. to EN 60947-1, Appendix N Between the coil and the contacts and between the individual contacts.		V	300	
Degree of protection acc. to EN 60529				
	- Enclosures		IP20	
	- Cover		IP40	
Permissible ambient temperature				
	- During operation	°C	-25 ... +60	
	- During storage	°C	-40 ... +80	
Mounting position (permissible)			Any	
Shock resistance Half-sine acc. to IEC 60028-2-27		g/ms	15/11	
Vibration resistance Acc. to IEC 60068-2-6		g/ms	10 ... 55/0.35	
Electromagnetic compatibility (EMC) Tests acc. to basic specification			IEC 61000-6-2/IEC 61000-6-4	
Conductor cross-section				
• Screw terminal				
	- Solid	mm^2	1 x (0.5 ... 4); 2 x (0.5 ... 2.5)	
	- Finely stranded with end sleeve	mm^2	2 x (0.5 ... 2.5)	
	- AWG conductors, solid or stranded	mm^2	2 x (20 ... 14)	
	- Terminal screw		M3.5	
	- Tightening torque	Nm	0.8 ... 1.2	
	- Corresponding opening tool		Standard screwdriver, size 2 or Pozidriv 2	
• Spring-loaded terminal				
	- Solid	mm^2	2 x (0.25 ... 1.5)	
	- Finely stranded with end sleeve	mm^2	2 x (0.25 ... 1)	
	- Finely stranded without end sleeve	mm^2	2 x (0.25 ... 1.5)	
	- AWG conductors, solid or stranded	AWG	2 x (24 ... 16)	
	- Corresponding opening tool		Screwdriver with 3 mm blade or 8WA2 807 opening tool	
Control side				
Operating range			0.85 ... 1.1 x U_s	
Rated output power				
	- max. DC	W	1	
	- max. AC	VA	8	
Bridging of supply failures				
	- depends on version	ms	5 ... 100	
Max. permissible conductor length			1 CO contact	2/3 CO contact
	- 330 pF/m AC	m	100	200
	- Min. cross-section: 0.75 mm^2 DC	m	2000	1500
Permissible residual current of the electronics (for 0 signal)		mA	2	
Temporarily flowing capacitor charging currents on energizing supply voltage		mA	450 for ≤ 500 µs[1)]	
Function display			Yellow LED	

1) Note the short-circuit limitation for control with the semiconductor version!

3RS18 Coupling Relays with Industrial Housing

Relay couplers

Type			3RS18 ..-....0	3RS18 ..-....1
Load side				
Continuous thermal current I_{th}		A	6	
Rated operational current I_e				
• AC-15				
	- at 24 V	A	3	
	- at 110 V	A	3	
	- at 230 V	A	3	
	- at 400 V	A	3	
• DC-13				
	- at 24 V	A	1	
	- at 110 V	A	0.2	
	- at 230 V	A	0.1	
Operational current for resistive load				
• AC-12				
	- at 24V	A	5	
	- at 115 V	A	5	
	- at 230V	A	5	
	- at 400 V	A	5	
• DC-12				
	- at 24V	A	5	
	- at 115 V	A	0.2	
	- at 230V	A	0.2	
Switching voltage				
	- max. AC	V	400	
	- max. DC	V	250	
Contact material			$AgSnO_2$	AgNi 0.15 hard gold-plated
Min. contact load				
• Standard contact			17 V DC/5 mA at 1 ppm fault	--
• Hard gold-plated contacts			--	5 V DC/1 mA at 1 ppm fault
Endurance				
• Mechanical		Operating cycles	20×10^6	
• Electrical (at I_e)		Operating cycles	1×10^6	
Operating times				
• Max. ON-delay at U_s		ms	8 (for 3RS18 00-..W0. < 30)	
• Max. OFF-delay at U_s		ms	30 (for 3RS18 00-..W0. < 150)	
Operating frequency		Switching cycles/h	5000	
Short-circuit protection Weld-free protection with gL/gG operational class at $I_k \geq 1$ kA		A	4	

Design

Plug-in relay coupling elements can be ordered complete or as single modules.

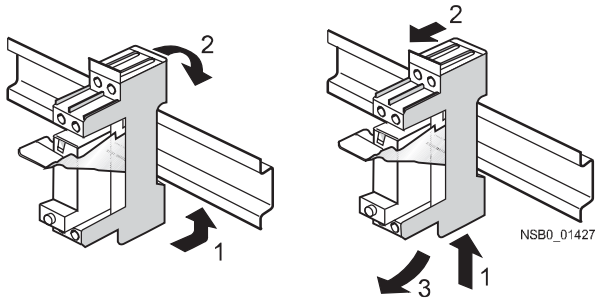
Installation

The relays are plugged into the socket and this is snapped onto a 35 mm standard mounting rail according to EN 50022.

A fixing bracket can be ordered for the MT series that additionally fixes the relay into a plug-in socket (under conditions of increased mechanical stress). For the RT and PT series, a combined fixing and ejection bracket is available which can be used to remove the relay where access is difficult, for example, when relays are mounted side-by-side.

They can be mounted as required.

Note: For the LZX plug-in relay coupling elements, the spring element must be hung onto the standard mounting rail from below and fixed in place.



Function

In accordance with the technical specifications of electronic systems, the coupling elements have a lower power consumption. In the versions equipped with LEDs, these indicate the switching status. The LZX:PT/MT relay couplers have a test button. This can be used to force the relay coupler into the tripped state and to lock it. This is indicated by a raised orange-colored lever.

Overvoltage damping

The 24 V DC relays LZX:RT and LZX:PT with LEDs can be supplied with, all others without integral surge suppression (freewheel diode connected in parallel with A1/A2). The positive supply voltage must be connected to coil terminal A1.

Logical disconnection

The terminals for the contacts and the terminals for the coil are arranged on separate levels, e.g. above for contacts and below for coil. Logical isolation is not identical to safe isolation.

Safe isolation

For safe isolation, transfer of the voltage of one circuit to another circuit is prevented to a suitable degree of safety (requirements and tests are described in EN 60947-1 in Appendix N).

Control with solid-state output

In the case of solid-state outputs (e.g. BERO) with overload and short-circuit protection, you must make allowance during configuration for the temporarily flowing capacitor charging currents!

This is possible, for example, by using a suitable LZX relay coupler.

Relay couplers

Technical specifications

Relay type		RT print relay, 8- and 11-pole, (12.7 mm) 1 CO/2 CO				PT industrial relay, 8-, 11- and 14-pole, (22.5 mm) 2 CO/3 CO/4 CO			
AC and DC operation									
Rated control supply voltage U_s [1]	V	24 DC	24 AC	115 AC	230 AC	24 DC	24 AC	115 AC	230 AC
Rated insulation voltage U_i Pollution degree	V	250 3				250 3			
Overvoltage category		III				III			
Safe isolation Between the coil and the contacts Acc. to EN 60947-1, Appendix N		Up to 250 V (with socket LZX:RT78626) No (for complete units with standard socket)				No			
Degree of protection		IP67/IP20				IP50/IP20			
Permissible ambient temperature									
• During operation	°C	-40 ... +70				-40 ... +70 (+50 for base assembly)			
• During storage	°C	-40 ... +80				-40 ... +80			
Conductor cross-sections									
• Solid	mm^2	2 x 2.5				2 x 2.5			
• Finely stranded with or without end sleeve	mm^2	2 x 1.5				2 x 1.5			
Control side									
Operating range									
• At 20 °C	V	16.8 ... 52	18 ... 52	86.3 ... 127	172 ... 264	18 ... 40.8	19.2 ... 39.6	92 ... 190	184 ... 380
Power consumption at U_s		0.4 W	0.75 VA	0.75 VA	0.75 VA	0.75 W	1 VA	1 VA	1 VA
Release voltage	V	2.4	7.2	34.5	69	3.6	7.2	34.5	69
Protection circuit		Freewheel diode for complete unit	No			Freewheel diode in LED module	No		
Max. permissible conductor length at U_s [2] (min. conductor cross-section: 0.75 mm^2)	m	> 2000	30 (with LED), 20 (without LED)			> 2000	500	200	50
Load side									
Switching voltage									
• AC/DC	V	24 ... 250				24 ... 250			
Rated current [3]									
Continuous thermal current I_{th}	A	16/8 (1 CO/2 CO)				12/10/6 (2 CO/3 CO/4 CO)			
Rated operational current I_e AC-15 acc. to utilization categories (DIN VDE 0660)	A	6/6				5/5/5			
Rated operational current I_e DC-13 acc. to utilization categories (DIN VDE 0660)	A	2 at 24 V 0.27 at 230 V				5 at 24 V 0.5 at 230 V			
Short-circuit protection $I_k \geq 1$ kA acc. to IEC 60947-5-1 Fuse links gL/gZ operational class DIAZED	A	10				6			
Shock resistance Half-sine acc. to IEC 60028-2-27	g/ms	10/11				9/11			
Vibration resistance Floating sine acc. to IEC 60068-2-6 30 ... 150 Hz									
• Opening the normally-closed contacts along the critical axis	g	5				Approx. 7			
• Closing the normally-open contacts	g	> 20				> 20			
Min. contact load (reliability: 1 ppm)		Standard 17 V, 10 mA; hard gold-plated 17 V/0.1 mA				Standard 17 V, 10 mA; hard gold-plated 20 mV/1 mA			
Mechanical endurance	Operating cycles	30×10^6	10×10^6			10×10^6			
Electrical endurance (resistive load at 250 V AC)	Operating cycles	1×10^5	1×10^5			1×10^5			
Operating frequency (operating cycles)									
Without load	1/min 1/h	1200 72000				600 36000			
With load	1/min 1/h	6 360				6 360			
Make-time	ms	7				15			
Break-time	ms	3				10			
Bounce time	ms	2				5			
Contact material		AgNi 90/10							

1) AC voltages, 50 Hz; for 60 Hz operation, the lower response value must be increased by 10 %; the power loss will reduce slightly.

2) The max. conductor length depends on the conductor capacity and the cable installation. It can be increased by means of parallel load on A1/A2.

3) Capacitive loads can result in micro-weldings on the contacts.

Relay type		MT industrial relay, 11-pole (35.5 mm) 3 CO			
AC and DC operation					
Rated control supply voltage U_s [1]	V	24 DC	24 AC	115 AC	230 AC
Rated insulation voltage U_i Pollution degree	V	250 3			
Overvoltage category Acc. to EN 60664		III			
Safe isolation Between the coil and the contacts Acc. to EN 60947-1, Appendix N		No			
Degree of protection		IP50/IP20			
Permissible ambient temperature • During operation • During storage	 °C °C	 -45 ... +60 -45 ... +80	 -45 ... +50 -45 ... +80	 -45 ... +50 -45 ... +80	 -45 ... +50 -45 ... +80
Conductor cross-sections • Solid • Finely stranded with or without end sleeve	 mm^2 mm^2	 2 x 2.5 2 x 1.5			
Control side					
Operating range • At 20 °C	V	18 ... 38	19.2 ... 38	92 ... 137	184 ... 264
Power consumption at U_s		1.2 W	2.3 VA	2.3 VA	2.3 VA
Release voltage	V	2.4	9.6	46	92
Protection circuit		No			
Max. permissible conductor length at U_s [2] (min. conductor cross-section: 0.75 mm^2)	m	> 2000	On request	On request	80
Load side					
Switching voltage • AC/DC	V	24 ... 250			
Rated current [3] Continuous thermal current I_{th} Rated operational current I_e /DC-13 Acc. to utilization categories (DIN VDE 0660) Rated operational current I_e /AC-15 Acc. to utilization categories (DIN VDE 0660)	 A A A	 10 2 at 24 V 0.27 at 230 V 5 at 24 V and 230 V			
Short-circuit protection $I_k \geq 1$ kA acc. to IEC 60947-5-1 Fuse links gL/gZ operational class DIAZED	A	10			
Shock resistance Half-sine acc. to IEC 60028-2-27	g/ms	13/11			
Vibration resistance Floating sine acc. to IEC 60068-2-6 30 ... 150 Hz • Opening the normally-closed contacts along the critical axis • Closing the normally-open contacts	 g g	 2 > 20			
Min. contact load (reliability: 1 ppm)		12 V DC/10 mA			
Mechanical endurance	Operating cycles	20 x 10^6			
Electrical endurance (resistive load at 250 V AC)	Operating cycles	4 x 10^5			
Operating frequency (operating cycles) Without load With load	 1/min 1/h 1/min 1/h	 100 6000 20 1200			
Make-time	typically /ms	12			
Break-time	typically /ms	5			
Bounce time	typically /ms	4			
Contact material		AgNi 90/10			

1) AC voltages, 50 Hz; for 60 Hz operation, the lower response value must be increased by 10 %; the power loss will reduce slightly.

2) The max. conductor length depends on the conductor capacity and the cable installation. It can be increased by means of parallel load on A1/A2.

3) Capacitive loads can result in micro-weldings on the contacts.

4-pole, 4 kW

Overview

Version

The 3TG10 power relays/miniature contactors with 4 main contacts are available with 6.3 mm ... 0.8 mm screw terminals or flat connectors. The versions with screw terminals are climate-proof and finger-safe according to DIN VDE 0106 Part 100.

The 3TG10 power relays/miniature contactors are small. Their width is 36 mm.

Technical specifications

Type				3TG10
General data				
Endurance				
• Mechanical		Operating cycles		3 million
• Electrical				
- AC-1 at I_e		Operating cycles		0.1 million
- AC-3 at I_e		Operating cycles		0.4 million
Rated insulation voltage U_i (pollution degree 3)			V	400
Rated impulse withstand voltage U_{imp}			kV	4
Safe isolation Between the coil and the contacts acc. to EN 60947-1, Appendix N			V	Up to 300
Permissible ambient temperature	During operation[1]		°C	-25 ... +55
	During storage		°C	-50 ... +80
Degree of protection acc. to EN 60529 (VDE 0470 Part 1)				IP00, drive system IP20
Power consumption of the magnetic coils (when coil is cold and 1.0 x U_s)	AC operation 45 ... 450 Hz		VA	4.4
	p.f.			0.9 (hum-free)
	DC operation		W	4
Coil operating range				0.85 ... 1.1 x U_s
Operating times (Total Break-time = OFF-delay + Arcing time)				
• ON-delay				
- Closing NO	- DC operation		ms	11 ... 50
	- AC operation		ms	10 ... 50
- Opening NC	- DC operation		ms	21 ... 39
	- AC operation		ms	20 ... 30
• OFF-delay				
- Closing NC	- DC operation		ms	5 ... 45
	- AC operation		ms	5 ... 45
- Opening NO	- DC operation		ms	19 ... 35
	- AC operation		ms	20 ... 30
Arcing time			ms	10 ... 15
Shock resistance				
• Rectangular pulse	AC operation and DC operation		g/ms	5.1/5 and 3.5/10
• Sine pulse	AC operation and DC operation		g/ms	7.9/5 and 5.2/10
Operating frequency z In operating cycles/hour rated operation	Acc. to AC-1		1/h	1000
	Acc. to AC-2		1/h	500
	Acc. to AC-3		1/h	1000
	No-load operating frequency		1/h	10000
Short-circuit protection				
Fuse links gL/gG operational class NH 3NA, DIAZED 5SB, NEOZED 5SE acc. to IEC 60947-4/ DIN VDE 0660 Part 102	• Type of coordination "1"		A	25
	• Type of coordination "2"		A	10
• Miniature circuit-breakers	Characteristic C		A	10
AC capacity				
Utilization category AC-1, switching resistive loads				
Rated operational current I_e up to 400 V at 55 °C[1]			A	20 for screw terminal, 16 for tab connector
Rated output power U_e for AC loads with p.f. = 1, 230/220 V				
• For screw terminal			kW	7.5 (13 at 400 V)
• For tab connector			kW	6 (10 at 400 V)
Minimum conductor cross-section for load with I_e			mm^2	2.5
Utilization category AC-2 and AC-3 **Operational current for AC-3 at 400 V rated value**			A	8.4
Rated output power for slipring or squirrel-cage motors with 50 Hz and 60 Hz and at 400 V			W	4000
Utilization category AC-5a (permissible nominal impedance: ≥ 0.5 Ω) **Switching gas discharge lamps**				
• Per main conducting path at 230 V, 50 Hz Rated output power/rated operational current per lamp				
• Uncorrected	18 W	0.37 A		43
	36 W	0.43 A		37
	58 W	0.67 A		24
• Lead-lag circuit	18 W	2 x 0.11 A		2 x 81
	36 W	2 x 0.21 A		2 x 42
	58 W	2 x 0.32 A		2 x 28

1) If the three main conducting paths carry a load of 20 A, the following applies if I > 10 A for the fourth conducting path: permissible ambient temperature 40 °C.

4-pole, 4 kW

Type						3TG10
AC capacity						
Switching gas discharge lamps with correction, solid-state ballast						
Per main current path 230 V, 50 Hz						
Rated output power per lamp/capacitance/rated operational current per lamp						
• Shunt compensation	L18 W	4.5 µF	0.11 A		units	15
	L36 W	4.5 µF	0.21 A		units	15
	L58 W	7 µF	0.32 A		units	10
• With solid-state ballast (single lamp)	L18 W	6.8 µF	0.10 A		units	39
	L36 W	6.8 µF	0.18 A		units	39
	L58 W	10 µF	0.27 A		units	26
• With solid-state ballast (two lamps)	L18 W	10 µF	0.18 A		units	2 x 26
	L36 W	10 µF	0.35 A		units	2 x 26
	L58 W	22 µF	0.52 A		units	2 x 12
Utilization category AC-5b, switching incandescent lamps					kW	1.6
Per main conducting path at 230 V, 50 Hz						
Load rating with DC						
Utilization category DC-1, switching resistive load (L/R ≤15 ms)						
Rated operational current I_e						
• 1 current path				up to 24 V	A	16
				60 V	A	6
				110 V	A	2
				220 V / 240 V	A	0.8
• 2 current paths in series				up to 24 V	A	16
				60 V	A	16
				110 V	A	6
				220 V / 240 V	A	1.6
• 3 current paths in series				up to 24 V	A	18
				60 V	A	18
				110 V	A	16
				220 V / 240 V	A	6
• 4 current paths in series				up to 24 V	A	20
				60 V	A	20
				110 V	A	20
				220 V / 240 V	A	20
Utilization category DC-3 and DC-5						
Shunt-wound and series-wound motors (L/R ≤15 ms)						
Rated operational current I_e						
• 1 current path				up to 24 V	A	10
				60 V	A	0.5
				110 V	A	0.15
				220 V / 240 V	A	0
• 2 current paths in series				up to 24 V	A	16
				60 V	A	5
				110 V	A	0.35
				220 V / 240 V	A	0
• 3 current paths in series				up to 24 V	A	16
				60 V	A	16
				110 V	A	10
				220 V / 240 V	A	1.75
• 4 current paths in series				up to 24 V	A	18
				60 V	A	16
				110 V	A	10
				220 V / 240 V	A	2
Conductor cross-sections						
With screw terminal						M3
• Finely stranded with end sleeve (DIN 46228 Form A/D/C)					mm^2	2 x (0.75 ... 2.5)
• Solid					mm^2	2 x (1 ... 2.5), 1 x 4
With tab connector						
• Finely stranded 6.3 mm push-on sleeve acc. to DIN 46245/46247						
- 6.3 ... 1					mm^2	0.5 ... 1
- 6.3 ... 2.5					mm^2	1 ... 2.5
CSA and UL rated data (screw terminal)						
Rated insulation voltage				AC	V	600
Uninterrupted current			Open and enclosed		A	20
Maximum horsepower ratings						1-phase/ 3-phase
(CSA and UL approved values)						
Rated output power for induction motors with 60 Hz						
				at 115 V	hp	0.5/ --
				200 V	hp	1/ 3
				230 V	hp	1.5/ 3
				460 V	hp	0/ 5
				575 V	hp	0/ 5
				600 V	hp	0/ 5

For short-circuit protection with overload relays see Protection Equipment: Overload Relays

Overview

Snap-on auxiliary switch blocks

The auxiliary switch blocks and the maximum number of blocks that can be mounted are described in the sections "Motor Contactors" and "Contactor relays".

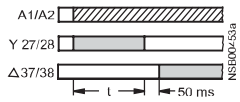
Solid-state time-delay auxiliary switch block

The timer module, which is available in the "ON-DELAY" and "OFF-DELAY" types, allows time-delayed functions up to 100 s (3 distinct delay ranges).

It contains a relay with one NO contact and one NC contact; depending on the version, the relay is switched either after an ON-delay or after an OFF-delay.

The timer module with "WYE-DELTA FUNCTION" is equipped with one delayed and one instantaneous NO contact, with an interval time of 50 ms between the two. The delay time of the NO contact can be set between 1.5 s and 30 s.

Wye-delta function:



The contactor on which the solid-state, time-delay auxiliary switch block is mounted operates without a delay.

Size S00

The solid-state, time-delay auxiliary switch block is fitted onto the front of the contactor. The timer module is supplied with power directly by plug-in contacts through the coil terminals of the contactor, in parallel with A1/A2. The timing function is activated by closing the contactor on which the auxiliary switch block is mounted. The OFF-delay variant operates without an auxiliary power supply; minimum on-time: 200 ms.

A varistor is integrated in the timer module in order to damp opening surges in the contactor coil.

The solid-state, time-delay auxiliary switch block cannot be mounted on size S00 coupling relays.

Sizes S0 to S12

The solid-state, time-delay auxiliary switch block is fitted onto the front of the contactor.

The timer module is supplied with power through two terminals (A1/A2); the time delay of the auxiliary switch block can be activated either by a parallel link to any contactor coil or by any power source.

The OFF-delay variant operates without an auxiliary power supply; minimum on-time: 200 ms.

A single-pole auxiliary switch block can be snapped onto the front of the contactor in addition to the timer module.

The timer module has no integrated components for damping opening surges.

Solid-state time-delay block with semiconductor output

The timer module in the "ON-DELAY" and "OFF-DELAY" versions allows time-delayed functions up to 100 s (3 distinct delay ranges). Contactors fitted with a time-delay block close or open after a delay according to the set time.

The ON-delay variant of the timing relay is connected in series with the contactor coil; terminal A1 of this coil must not be connected.

With the OFF-delay variant of the timing relay, the contactor coil is contacted directly through the relay; terminals A1 and A2 of the contactor coil must not be connected.

The timing relays are suitable for both AC and DC operation.

Size S00

The version for size S00 contactors is fitted onto the front of the contactor (with the supply voltage switched off) and then slid into its latched position; at the same time, the timing relay is connected by means of plug-in contacts to coil terminals A1 and A2 of the contactor. Any contactor coil terminals which are not required are sealed off by means of covers on the enclosure of the time-delay block, to prevent them from being connected inadvertently.

A varistor is integrated in the timer module in order to damp opening surges in the contactor coil.

The solid-state, time-delay block cannot be mounted on size S00 coupling relays.

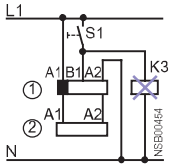
Sizes S0 to S3

The time-delay block for size S0 to S3 contactors is plugged into coil terminals A1 and A2 on top of each contactor; the timing relay is connected both electrically and mechanically by means of pins.

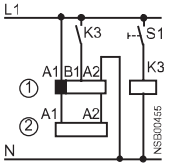
A varistor is integrated in the timer module in order to damp opening surges in the contactor coil.

Note on configuration

a)



b)



① Timing relay block
② Contactor

The activation of loads parallel to the start input is not permissible when using AC control voltage (see (a) in the circuit diagram).

The 3RT19 16-2D... / 3RT19 26-2D... OFF-delay time relay blocks have a zero potential start input B1. This means that if there is a parallel load on terminal B1, activation can be simulated with AC voltage. In this case, the additional load (e.g. contactor K3) must be wired in accordance with (b).

OFF-delay device for size S00 to S3 contactors

AC and DC operation

IEC 60947, EN 60947

For screw and snap-on mounting onto 35 mm standard mounting rail. The OFF-delay devices have screw terminals.

The OFF-delay device prevents a contactor from dropping out unintentionally when there is a short-time voltage dip or voltage failure. It supplies a downstream, DC-operated contactor with the necessary power during a voltage dip, ensuring that the contactor does not trip. The 3RT19 16 OFF-delay devices are specifically designed for operation with the 3RT contactors and 3RH contactor relays of the SIRIUS series.

The OFF-delay device operates without external voltage on a capacitive basis, and can be energized with either AC or DC (24 V version only for DC operation). Voltage matching, which is only necessary with AC operation, is performed using a rectifier bridge.

A contactor opens after a delay when the capacitors of the contactor coil, built into the OFF-delay device, are switched in parallel. In the event of voltage failures, the capacitors are discharged via the coil and thereby delay the opening of the contactor.

Accessories for 3RT, 3RH contactors and contactor relays

If the command devices are upstream of the OFF-delay device in the circuit, the OFF-delay takes effect with every opening operation. If the opening operation is downstream of the OFF-delay device, an OFF-delay only applies in the event of failure of the mains voltage.

Operation

In the case of the versions for rated control supply voltages of 110 V and 230 V, either AC voltage or DC voltage can be applied on the line side, whereas the variant for 24 V is designed for DC operation only.

A DC-operated contactor is connected to the output in accordance with the input voltage that is applied.

The mean value of the OFF-delay is approximately 1.5 times the specified minimum time.

Surge suppressors

- Without LED (also for Cage Clamp terminals) size S00, S0, S2, S3, S6 to S12
- With LED (also for Cage Clamp terminals) size S00

All 3RT1 contactors and 3RH1 contactor relays can be retrofitted with RC elements or varistors for damping opening surges in the coil. Diodes or diode assemblies (comprising noise suppression diodes and Zener diodes for rapid switch-off) can be used.

The surge suppressors are plugged onto the front of size S00 contactors. Space is provided for them next to a snap-on auxiliary switch block.

With all size S0 to S3 contactors, varistors, RC elements and diode assemblies can be plugged on directly at the coil terminals, either on the top or underneath.

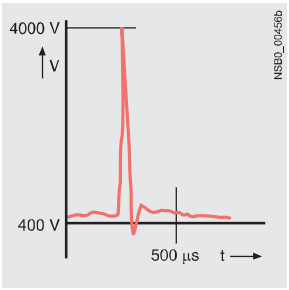
The plug-in direction of the diodes and diode assemblies is determined by a coding device.

Coupling relays are supplied either without overvoltage damping or with a varistor or diode connected as standard, according to the version.

Note:
The OFF-delay times of the NO contacts and the ON-delay times of the NC contacts increase if the contactor coils are damped against voltage peaks (noise suppression diode 6 to 10 times; diode assemblies 2 to 6 times, varistor +2 to 5 ms).

Electromagnetic interference suppression module, 3-phase for size S00 contactors

A so-called counter-e.m.f. (electromotive force) is produced when motors or various inductive loads are turned off. Voltage peaks of up to 4000 V may occur as a result, with a frequency spectrum from 1 kHz to 10 MHz and a rate of voltage variation from 0.1 to 20 V/ns.



Capacitive input to various analog and digital signals makes it necessary to suppress interference in the load circuit.

Reducing contact arcing

The connection between the main conducting path and the EMC interference suppression module enables contact arcing, which is responsible for contact erosion and the majority of clicking noises, to be reduced; this in turn is conducive to an electromagnetically compatible design.

Higher operational reliability

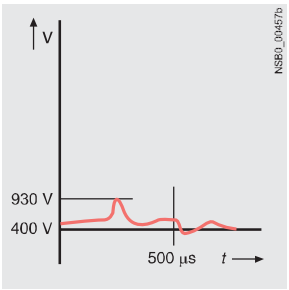
Since the EMC interference suppression module achieves a significant reduction in radio-frequency components and the voltage level in three phases, the contact endurance is also improved considerably. This makes an important contribution towards enhancing the reliability and availability of the system as a whole.

Dispensing with fine graduations

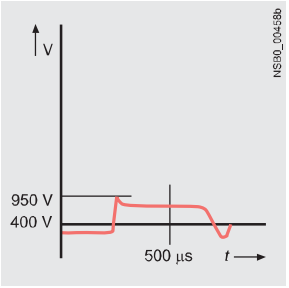
There is no need for fine graduations within each performance class, as smaller motors inherently have a higher inductance, so that one solution for all fixed-speed drives up to 5.5 kW is adequate.

Two electrical variants are available:

- The advantages of the RC circuit lie mainly in the reduction in the rate of rise and in its RF damping ability. The selected values ensure effective interference suppression over a wide range.



- The varistor circuit can absorb a high energy level and can also be used for frequencies ranging from 10 to 400 Hz (closed-loop controlled drives). There is no limiting below the knee-point voltage, however.



Additional load module

- Size S00 for plugging onto the front of the contactors with and without auxiliary switch block

Coupling devices for mounting on contactors of sizes S0 to S3

DC operation

IEC 60947 and EN 60947

The coupling link is suitable for use in any climate. It is finger-safe according to EN 50274. The terminal designations comply with EN 50005.

System-compatible operation with 24 DC V, operating range 17 V to 30 V.

Low power consumption in conformity with the technical specifications of the solid-state systems. A light-emitting diode indicates the circuit state.

Surge suppression

The 3RH19 24-1GP11 coupling link has an integrated surge suppressor (varistor) for the contactor coil being switched.

Installation

The 3RH19 24-1GP11 coupling link is mounted directly on the contactor coil.

Solder pin adapters

The solder pin adapters for the size S00 contactors are available in two versions:

- Solder pin adapter for contactors with one integrated auxiliary contact
- Solder pin adapter for contactors with mounted 4-pole auxiliary switch block

Screw adapters

Plug-on adapters improve the accessibility of the screw fixing for size S0 contactors. As a result it is possible to position the screwdriver vertically even when using insulated screwdrivers or power screwdrivers.

Optionally the adapters can be rotated through 90° before mounting.

Sealable covers for sizes S00 to S12

When contactors and contactor relays are used in safety-oriented applications, it must be ensured that it is impossible to operate the contactors manually.

For SIRIUS contactors there are sealable covers available for this purpose as accessories; these prevent accidental manual operation. These are transparent molded-plastic caps with a bracket that enables the contactor to be sealed.

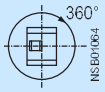
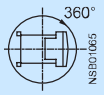
Technical specifications

Technical specifications according to EN 61812-1 (VDE 0435 Part 2021)

Contactor	Type			**3RT19 26-3A** **Mechanical latching block for the 3RT1. 2. and 3RT1. 3. contactors**
Rated insulation voltage U_i (pollution degree 3)			V	690
Mechanical endurance (operating cycles)		with 3RT1. 2 with 3RT1. 3		3 million 50000
Permissible ambient temperature	During operation During storage		°C °C	-25 ... +60 -50 ... +80
Degree of protection Acc. to EN 60947-1/EN 60947-1, Appendix C				IP20
Operating range of the coil At AC 50/60 Hz and DC				0.85 ... 1.1 x U_s
Power consumption of the coils of the unlocking magnet (for cold coil and 1.0 x U_s) AC and DC operation			W	Approx. 4
Command duration for de-energizing				
• AC operation • DC operation			ms ms	18 ... 31 18 ... 26
Conductor cross-sections				
• Solid			mm^2 AWG	2 x (0.5 ... 2.5); 1 x 4 2 x 14; 1 x 12
• Finely stranded with end sleeve			mm^2 AWG	2 x (0.5 ... 2.5); 1 x 2.5 2 x 14; 1 x 12
Tightening torque for terminal screws			Nm lb.in	0.8 ... 1.1 7 ... 9.5

Accessories for 3RT, 3RH contactors and contactor relays

Contactor	Type		3RT19 .6-2C 3RT19 .6-2D Solid-state time-delay blocks with semi-conductor output	3RT19 .6-2L Solid-state time-delay blocks with semi-conductor output	3RT19 .6-2E 3RT19 .6-2F 3RT19 .6-2G Solid-state time-delay auxiliary switch blocks
Rated insulation voltage U_i (pollution degree 3) Overvoltage category III acc. to DIN VDE 0110		V AC	250	300	250
Operating range of excitation			0.8 ... 1.1 x U_S, 0.95 ... 1.05 times rated frequency	0.85 ... 1.1 x U_S, 0.95 ... 1.05 times rated frequency	
Rated output power		W	1		2
Power consumption at 230 V AC, 50 Hz		VA	1	4	
Rated operational current I_e					
• AC-14, DC-13		A A	0.3 for 3RT19 16 0.3 for 3RT19 26		-- --
• AC-15, 230 V, 50 Hz		A	--	3	
• DC-13, 24 V		A	--	1	
• DC-13, 110 V		A	--	0.2	
• DC-13, 230 V		A	--	0.1	
DIAZED protection gL/gG operational class		A	--	4	
Operating frequency for load • With I_e 230 V AC • With 3RT10 16 contactor, 230 V AC		h^{-1} h^{-1}	2500 2500	5000	
Recovery time		ms	50	150	
Minimum ON period		ms	35	35 (OFF-delay with auxiliary voltage)	200 (with OFF-delay)
Residual current	max.	mA	5	--	
Voltage drop With conducting output	max.	VA	3.5	--	
Short-time loading capacity	up to 10 ms	A	10	--	
Setting accuracy With reference to upper limit of scale	max.	%	±15		
Repeat accuracy	max.	%	±1		
Mechanical endurance		Operating cycles	100 x 10^6	10 x 10^6	
Permissible ambient temperature					
	During operation	°C	-25 ... +60		
	During storage	°C	-40 ... +80		
Degree of protection acc. to EN 60947-1, Appendix C • Cover • Terminals			IP40 IP20		
Connection of conductors					
• Solid		mm^2	2 x (0.5 ... 1.5), 2 x (0.75 ... 4)		
• Finely stranded with end sleeve		mm^2	2 x (0.5 ... 2.5)		
• AWG conductors, solid or stranded		AWG	2 x (18 ... 14)		
• Terminal screw - Tightening torque		Nm	M3 0.8 ... 1.2		
Permissible mounting position			Any		
Shock resistance Half-sine acc. to IEC 60068-2-27		g/ms	15/11		
Vibration resistance Acc. to IEC 60068-2-6		Hz/mm	10 ... 55 /0.35		
EMC tests	basic specification		IEC 61000-6-4	IEC 61000-6-2; IEC 61000-6-4	IEC 61000-6-4
Overvoltage protection			Varistor integrated in timing relay		--

Versions			3RT1 916-2BE01 OFF-delay devices	3RT1 916-2BK01	3RT1 916-2BL01
Connectable contactor sizes Caution! Only contactors and contactor relays with DC operation can be connected.					
	• DC supply • AC supply		S00 ... S3 --	S00/S0 S00/S0	S00/S0 S00/S0
	Type		3RT10 ..-1BB4., 3RH1. ..-1BB40	3RT10 1.-1BF4, 3RT10 2.-1BF4, 3RH1. ..-1BF40	3RT10 1.-1BM4./1BP4., 3RT10 2.-1BM4./1BP4., 3RH1. ..-1BM40/1BP40
Permissible mounting position					
Rated control supply voltage U_s Operating range		V	24 (DC) 0.9 ... 1.1 U_s	110 (UC)	220/230 (UC)
Rated frequency/ies with AC supply	f	Hz ±5 %	--	50 / 60	50 / 60
Ambient temperature permissible:					
• During storage	T_u	°C	-40 ... +80		
• During operation					
- Series-mounting without distance	T_u	°C	-25 ... +50		
- Series-mounting with 5 mm distance	T_u	°C	-25 ... +60		
OFF-delay [1] (minimum times at U_{sp} = 0.9 x U_s, T_{sp} = 20 °C)			Note: In practice the mean value is 1.5 times the minimum time.		
• S00	t_{off} >	ms	250	130	600
• S0	t_{off} >	ms	150	100	400
• S2 (only for DC supply)	t_{off} >	ms	90	--	--
• S3 (only for DC supply)	t_{off} >	ms	70	--	--
Installed capacity C 3RT19 16-2B.01 Capacitor voltage		 µF V	 2 000 35	 68 180	 68 350
ON delay (maximum at U_{sp} = 0.9 x U_s, T_{sp} = 20 °C)			Note: The total ON-delay = Contactor make time + t_{on}		
• S00	t_{on} <	ms	10	60	200
• S0	t_{on} <	ms	10	80	250
Mechanical endurance **Endurance, electrical approx.**	In million operating cycles In million operating cycles		30 >1		
Operating frequency z max. (at T_u = 60 °C)		h^{-1}	300		
Power loss P_v max. approx.		W	0.4	0.5	1
Overvoltage damping			With varistor, integrated		
Conductor cross-sections U_{sp} = Coil voltage T_{sp} = Coil temperature			[2]		

1) Doubling the time delay can be achieved by doubling the capacitance. Commercially available capacitors can be used, which can be connected to terminals C+ and Z–.

2) See 3RT10 1 contactors, page 3/20.

Accessories for 3RT, 3RH contactors and contactor relays

Contactor	Type			3RT19 26-2P. Pneumatic delay block[1]
General data				
Mechanical endurance	In million operating cycles			5
Electrical endurance at I_e	In million operating cycles			1
Rated insulation voltage U_i (pollution degree 3)			V	690
Permissible ambient temperature				
	During operation		°C	-25 ... +60
	During storage		°C	-50 ... +80
Rated operational current I_e Acc. to utilization categories EN 60947				
• AC-12			A	10
• AC-15/AC-14 at U_e		up to 230/220 V	A	6
		400/380 V	A	4
		500 V	A	2.5
		690/660 V	A	1.5
• DC-13 at U_e		24 V	A	4
		48 V	A	2
		110 V	A	0.7
		220 V	A	0.3
		440 V	A	0.15
Conductor cross-sections				
• Solid, stranded			mm^2	2 x 0.5 ... 2.5 or 2 x 2.5 ... 4
• Finely stranded with end sleeve			mm^2	2 x 0.5 ... 2.5
• AWG cables			AWG	2 x 22 ... 12
• Tightening torque of the terminal screws			Nm	0.8 ... 1.1
Time delay				
• Accuracy				±10%
CSA and UL rated data				
• Rated voltage			V AC	600
• Switching capacity				A 600, Q 600

1) For size S0.
In addition to the pneumatic delay block, no other auxiliary contacts are permitted.

Contactor	Type			3RH19 24	3TX7 090
				Coupling relays for mounting on contactors acc. to IEC 60947/EN 60947	
General data					
Rated insulation voltage U_i (pollution degree 3)			V	300	
Safe isolation Between the coil and the contacts acc. to EN 60947-1, Appendix N			V AC	Up to 300	
Degree of protection acc. to EN 60947-1, Appendix C					
		• Connections		IP20	
		• Enclosures		IP40	
Permissible ambient temperature					
		• During operation	°C	-25 ... +60	
		• During storage	°C	-40 ... +80	
Conductor cross-section					
		• Solid	mm^2	2 x (0.5 ... 2.5)	
		• Finely stranded with end sleeve	mm^2	2 x (0.5 ... 1.5)	
		• Terminal screws		M3	
Short-circuit protection (weld-free protection at $I_k \geq 1$ kA) Fuse links, gL/gG operational class NH 3NA, DIAZED 5SB, NEOZED 5SE			A	6	
Control side					
Rated control supply voltage U_s			V DC	24	
Operating range			V DC	17 ... 30	
Power consumption at U_s			W	0.5	
Nominal current input			mA	20	
Release voltage			V	≥ 4	
Function display				Yellow LED	
Protection circuit				Varistor	
Load side					
Mechanical endurance	In million operating cycles			20	
Electrical endurance at I_e	In million operating cycles			0.1	
Operating frequency	Operating cycles		h^{-1}	5000	
Make-time			ms	Approx. 7	
Break-time			ms	Approx. 4	
Bounce time			ms	Approx. 2	
Contact material				AgSnO	
Switching voltage			V AC/DC	24 ... 250	
Permissible residual current of the electronics (for 0 signal)			mA	2.5	
Rated operational current[1] Continuous thermal current I_{th}			A	6	
Rated operational current I_e Acc. to utilization categories EN 60947					
• AC-15		- at 24 V	A	3	
		- at 110 V	A	3	
		- at 230 V	A	3	
• DC-13		- at 24 V	A	1	
		- at 110 V	A	0.2	
		- at 230 V	A	0.1	
Switching current With resistive load to EN 60255 (relay standard) and EN 60947					
• AC-12		- at 24 V	A	6	
		- at 110 V	A	6	
		- at 230 V	A	6	
• DC-12		- at 24 V	A	6	
		- at 110 V	A	0.3	
		- at 230 V	A	0.2[1]	

1) Capacitive loads can result in micro-weldings on the contacts.

Accessories for 3TB, 3TC, 3TF, 3TG, 3TK contactors

Technical specifications

For 3TF2 contactors			**Auxiliary contact block**
Type			**3TX4 4..-..**
General data			
Permissible mounting position	AC and DC operation		Any
Mechanical endurance	AC operation DC operation	Operating cycles	10 million 30 million
Rated insulation voltage U_i (pollution degree 3) • Screw terminal		V	500
Rated impulse withstand voltage U_{imp} (pollution degree 3) • Screw terminal		kV	6
Safe isolation Between the coil and the contacts acc. to EN 60947-1, Appendix N		V	Up to 300
Positively-driven operation			
3TF2 basic unit or complete unit			ZH1/457, SUVA
3TF20 basic unit with 3TX4 4 auxiliary switch block	Upper level Lower level Different levels		ZH1/457, SUVA ZH1/457, SUVA SUVA
Permissible ambient temperature[1]	During operation During storage	°C °C	-25 ... +55 -55 ... +80
Degree of protection Acc. to EN 60947-1, Appendix C			IP20 for screw terminal
Touch protection Acc. to EN 50274			Finger-safe for screw terminal
Resistance to shock			
Rectangular pulse	AC operation DC operation	g/ms g/ms	7/5 and 4/10 10/5 and 6/10
Sine pulse	AC operation DC operation	g/ms g/ms	9/5 and 6/10 13/5 and 8/10
Short-circuit protection			
Short-circuit protection			
Fuse-links gL/gG NH 3NA, DIAZED 5SB, NEOZED 5SE		A	6
Weld-free protection at $I_k \geq 1$ kA			

1) Applies to 50/60 Hz coil
Operating range at 60 Hz: 0.85 ... 1.1 x U_s;
at 50 Hz, 1.1 x U_s, side-by-side mounting and 100% ON period
the max. ambient temperature is +40 °C.

Technical specifications

For 3TH2 contactor relays			**Auxiliary switch block**
Type			**3TX4 4..-..**
General data			
Permissible mounting position	AC and DC operation		Any
Mechanical endurance	AC operation DC operation	Operating cycles	10 million 30 million
Rated insulation voltage U_i (pollution degree 3) • Screw terminal		V	500
Rated impulse withstand voltage U_{imp} (pollution degree 3) • Screw terminal		kV	6
Safe isolation Between the coil and the contacts acc. to EN 60947-1, Appendix N		V	Up to 300
Positively-driven operation			
3TH2 basic unit or complete unit			ZH1/457, SUVA
3TH20 basic unit with 3TX4 4 auxiliary switch block	Upper level Lower level Different levels		ZH1/457, SUVA ZH1/457, SUVA SUVA
Permissible ambient temperature[1]	During operation During storage	°C °C	-25 ... +55 -55 ... +80
Degree of protection acc. to EN 60947-1, Appendix C			IP20 for screw terminal
Touch protection acc. to EN 50274			Finger-safe for screw terminal
Resistance to shock			
Rectangular pulse	AC operation DC operation	g/ms g/ms	7/5 and 4/10 10/5 and 6/10
Sine pulse	AC operation DC operation	g/ms g/ms	9/5 and 6/10 13/5 and 8/10
Short-circuit protection			
Short-circuit protection			
Fuse-links gL/gG NH 3NA, DIAZED 5SB, NEOZED 5SE		A	6
Weld-free protection at $I_k \geq 1$ kA			

1) Applies to 50/60 Hz coil
Operating range at 60 Hz: 0.85 ... 1.1 x U_s;
at 50 Hz, 1.1 x U_s, side-by-side mounting and 100% ON period the max. ambient temperature is +40 °C.

Project planning aids

Overview

Dimensional drawings

Schematics

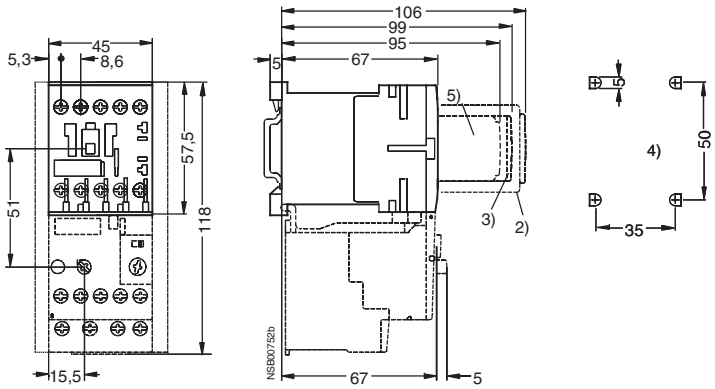
Dimensional drawings

3RT10 contactors, 3-pole

3RT10 1 contactors, size S00

Screw terminals

With surge suppressor, auxiliary switch block and mounted overload relay

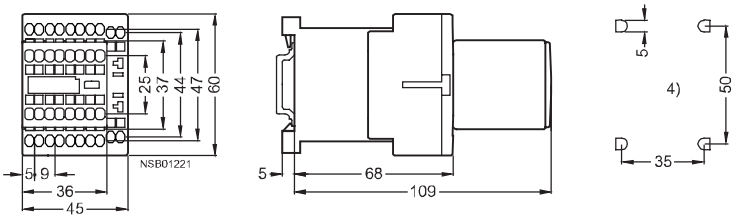


Lateral distance to
grounded components = 6 mm

2) Auxiliary switch block
(also 3RH19 11- . NF . .
solid-state compatible version)
3) Surge suppressor
(also 3RT19 16-1GA00 additional load module)
4) Drilling pattern
5) Auxiliary switch block
1-pole

3RT10 1 contactors, size S00

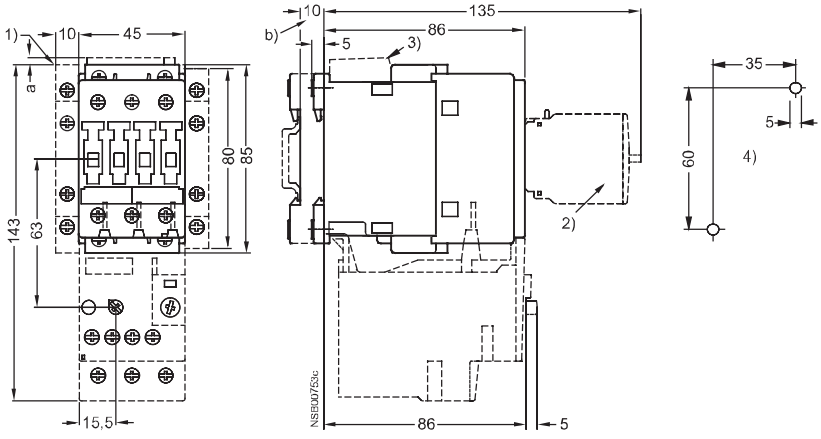
Cage Clamp terminal with auxiliary switch block



3RT10 2 contactors, 3RT10 2 coupling relays, size S0

Screw terminals

With surge suppressor, auxiliary switch blocks and mounted overload relay



For size S0:

a = 3 mm at < 240 V
a = 7 mm at > 240 V
b = DC 10 mm deeper than AC
1) Auxiliary switch block, laterally mountable
2) Auxiliary switch block, mountable on the front, 1, 2 and 4-pole (also 3RH19 21- .FE22 solid-state compatible version)
3) Surge suppressor
4) Drilling pattern

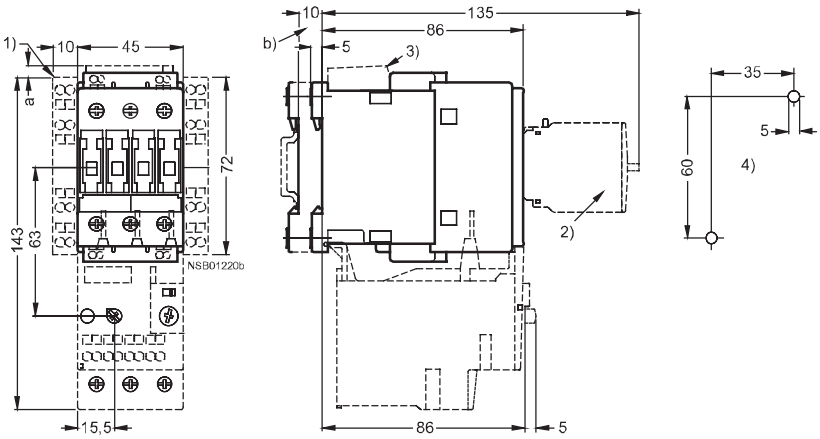
Project planning aids

3RT10 contactors, 3-pole

3RT10 2 contactors, 3RT10 2 coupling relays, size S0

Cage Clamp terminal

With surge suppressor, auxiliary switch blocks and mounted overload relay



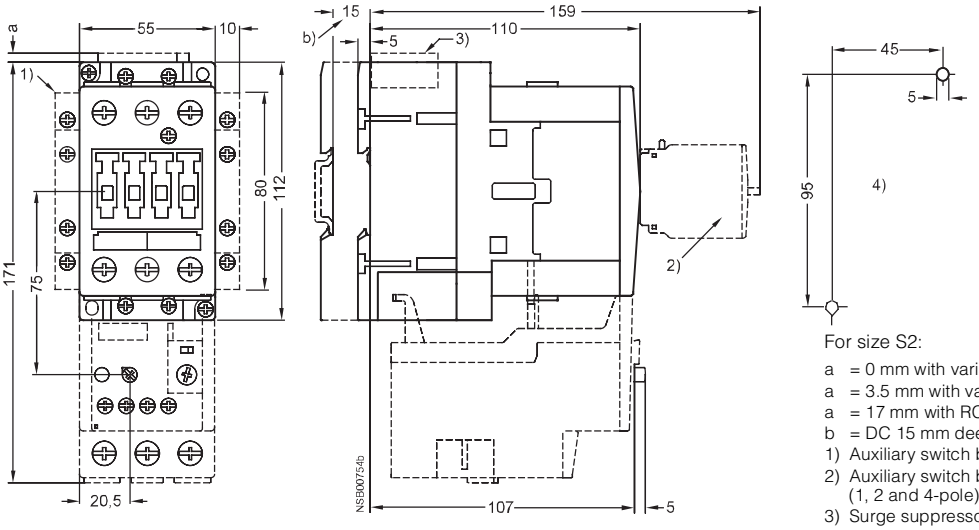
For size S0:

a = 0 mm with varistor < 240 V, diode assembly
a = 3.5 mm with varistor > 240 V
a = 17 mm with RC element
b = DC 10 mm deeper than AC
1) Auxiliary switch block, laterally mountable
2) Auxiliary switch block, mountable on the front, (1, 2 and 4-pole)
3) Surge suppressor
4) Drilling pattern

3RT10 3 contactors, size S2

Screw terminal

With surge suppressor, auxiliary switch blocks and mounted overload relay

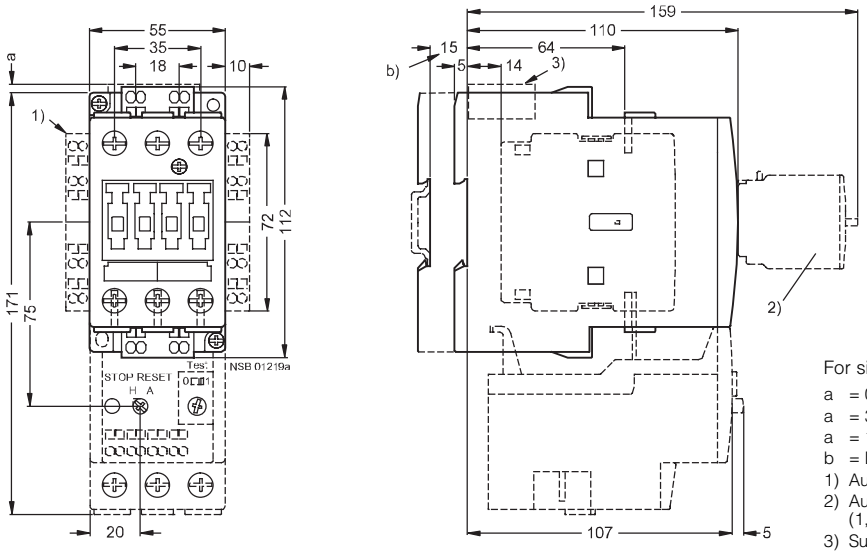


For size S2:

a = 0 mm with varistor < 240 V, diode assembly
a = 3.5 mm with varistor > 240 V
a = 17 mm with RC element
b = DC 15 mm deeper than AC
1) Auxiliary switch block, laterally mountable
2) Auxiliary switch block, mountable on the front, (1, 2 and 4-pole)
3) Surge suppressor
4) Drilling pattern

3RT10 and 3RT14 contactors, 3-pole

3RT10 3 contactors, size S2
Cage Clamp terminal
With surge suppressor, auxiliary switch blocks and mounted overload relay

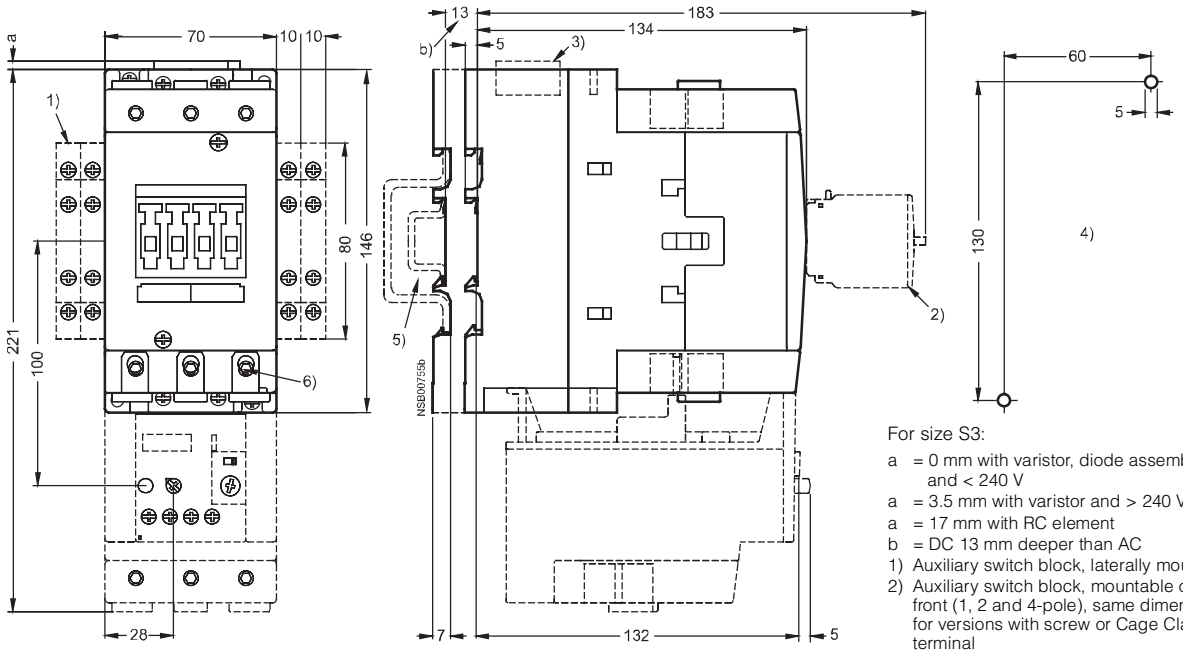


For size S2:

a = 0 mm with varistor < 240 V, diode assembly
a = 3.5 mm with varistor > 240 V
a = 17 mm with RC element
b = DC 15 mm deeper than AC
1) Auxiliary switch block, laterally mountable
2) Auxiliary switch block, mountable on the front, (1, 2 and 4-pole)
3) Surge suppressor
4) Drilling pattern

3RT10 4, 3RT14 46 contactors, size S3
Screw terminal
With surge suppressor, auxiliary switch blocks and mounted overload relay

Lateral distance to
grounded components = 6 mm



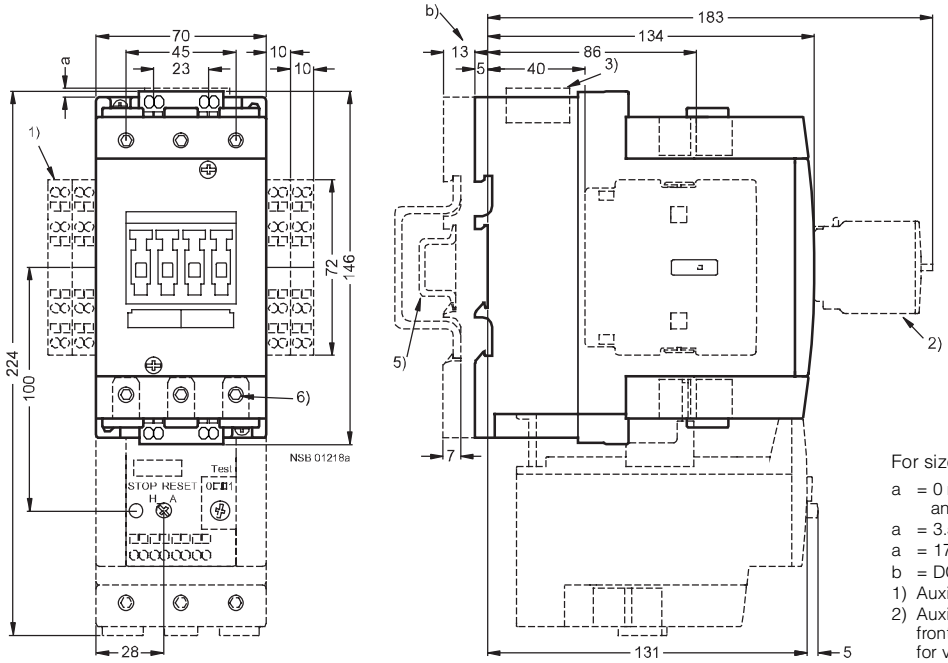
For size S3:

a = 0 mm with varistor, diode assembly and < 240 V
a = 3.5 mm with varistor and > 240 V
a = 17 mm with RC element
b = DC 13 mm deeper than AC
1) Auxiliary switch block, laterally mountable
2) Auxiliary switch block, mountable on the front (1, 2 and 4-pole), same dimensions for versions with screw or Cage Clamp terminal
3) Surge suppressor
4) Drilling pattern
5) For mounting on 35 mm standard mounting rail and 15 mm deep according to EN 50022 or 75 mm standard mounting rail according to EN 50023
6) Allen screw 4 mm

Project planning aids

3RT10 contactors, 3-pole

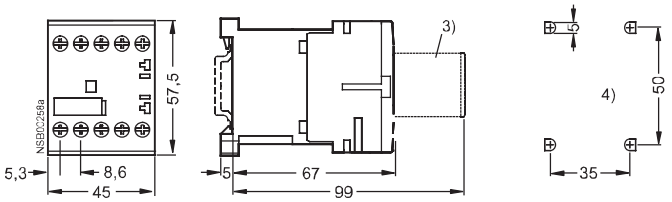
3RT10 4 contactors, size S3
Cage Clamp terminal
With surge suppressor, auxiliary switch blocks and mounted overload relay



For size S3:

a = 0 mm with varistor, diode assembly and < 240 V
a = 3.5 mm with varistor and > 240 V
a = 17 mm with RC element
b = DC 13 mm deeper than AC
1) Auxiliary switch block, laterally mountable
2) Auxiliary switch block, mountable on the front (1, 2 and 4-pole), same dimensions for versions with screw or Cage Clamp terminal
3) Surge suppressor
4) Drilling pattern
5) For mounting on 35 mm standard mounting rail and 15 mm deep according to EN 50022 or 75 mm standard mounting rail according to EN 50023
6) Allen screw 4 mm

3RT10 coupling relays, size S00
With surge suppressor



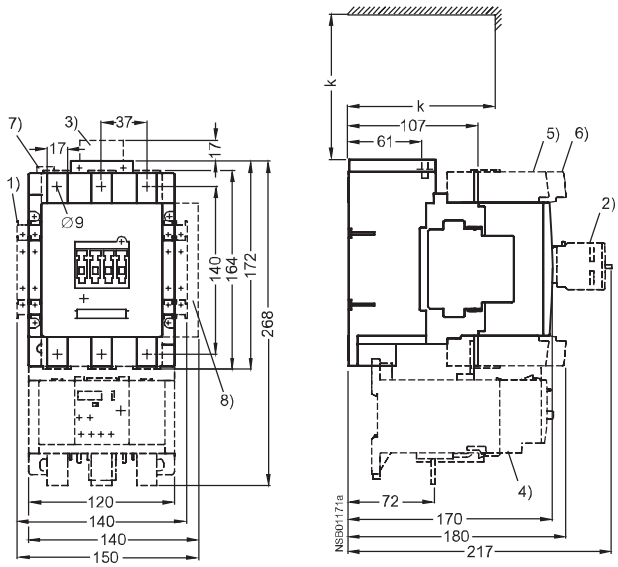
Deviating dimensions for coupling relays with Cage Clamp terminal:
Height: 60 mm

3) Surge suppressor
4) Drilling pattern

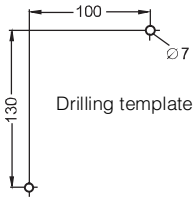
3RT10 and 3RT14 contactors, 3-pole

3RT10 5, 3RT14 5 contactors, size S6

With lateral and front mounted auxiliary switch block mounted overload relay and box terminals, lateral solid-state module with remaining lifetime indicator



Distance from grounded parts
Lateral: 10 mm
Front: 20 mm



Drilling template

For size S6:

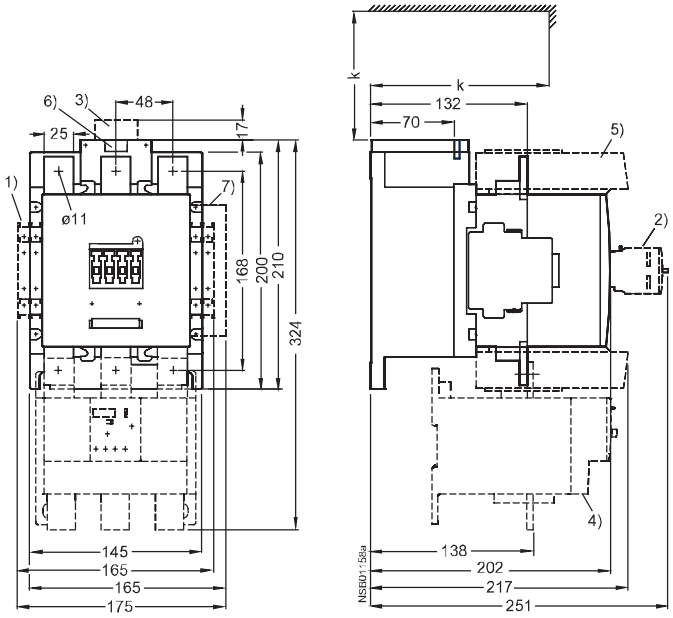
k = 120 mm (minimum clearance for removing the withdrawable coil)
1) 2nd auxiliary switch block, lateral
2) Auxiliary switch block, mountable on the front
3) RC element
4) 3RB20 overload relay, mounted
5) 3RT19 55-4G box terminal block (Allen screw 4 mm)
6) 3RT19 56-4G box terminal block (Allen screw 4 mm)
7) PLC connection 24 V DC and changeover switch (for 3RT1…-.N)
8) Solid-state module with remaining lifetime indication (auxiliary switch block not mountable on right-hand side)

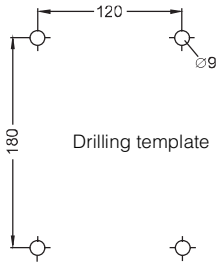
Project planning aids

3RT10 and 3RT14 contactors, 3-pole

3RT10 6, 3RT14 6 contactors, size S10

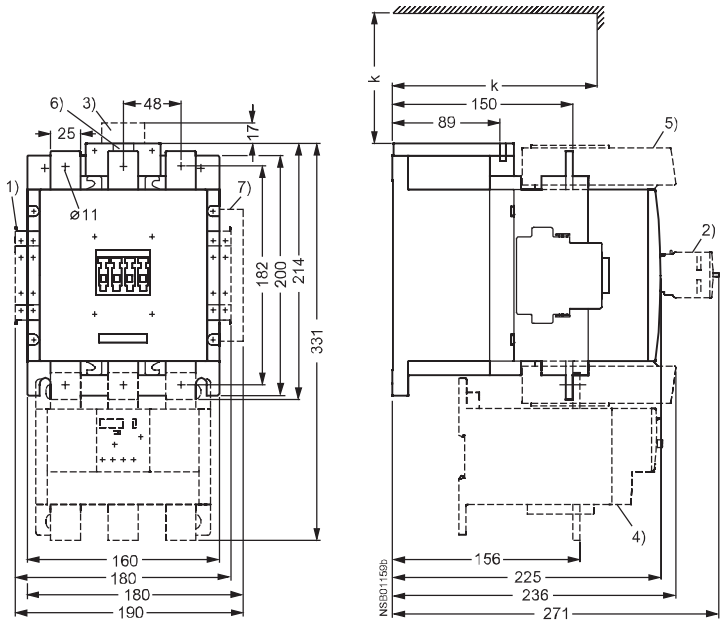
With lateral and front mounted auxiliary switch block
mounted overload relay and box terminals,
lateral solid-state module with remaining lifetime indicator

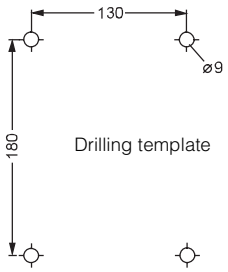




3RT10 7, 3RT14 7 contactors, size S12

With lateral and front mounted auxiliary switch block
mounted overload relay and box terminals,
lateral solid-state module with remaining lifetime indicator





For sizes S10 and S12:
Distance from grounded parts
Lateral: 10 mm
Front: 20 mm

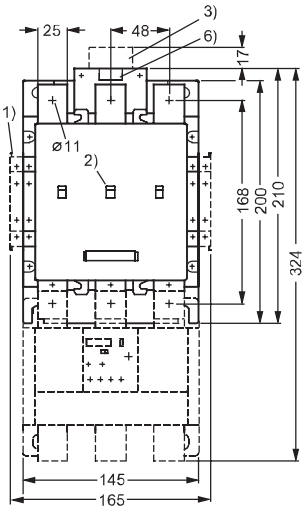
For sizes S10 and S12:

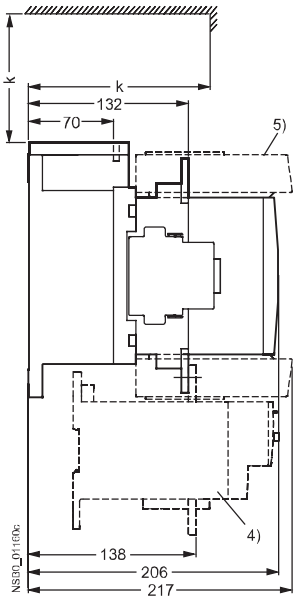
k = 150 mm (minimum clearance for removing the withdrawable coil)

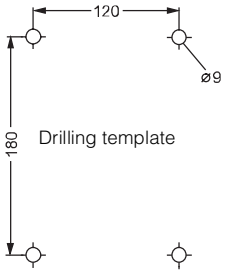
1) 2nd auxiliary switch block, lateral
2) Auxiliary switch block, mountable on the front
3) RC element
4) 3RB20 overload relay, mounted
5) Box terminal block (allen screw 6 mm)
6) PLC connection 24 V DC and changeover switch (for 3RT1…-.N)
7) Solid-state module with remaining lifetime indication (auxiliary switch block not mountable on right-hand side)

3RT12 vacuum contactors, 3-pole

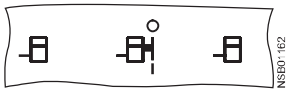
3RT12 6 vacuum contactors, size S10
With lateral auxiliary switch block,
mounted overload relay and box terminals



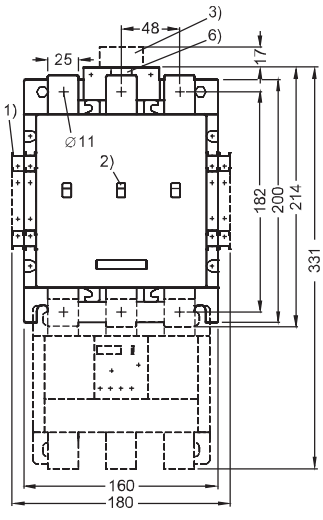


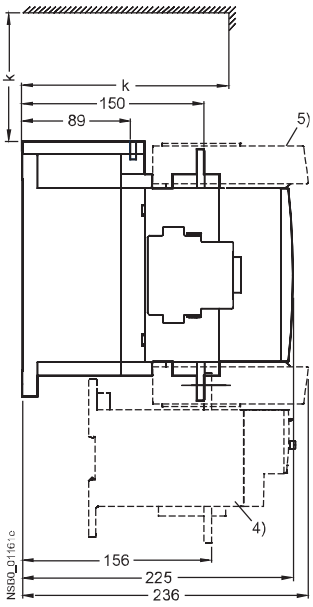


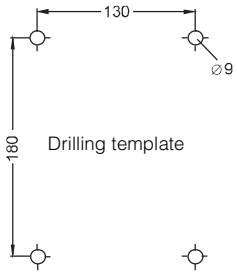
Detail for 2)
Contact erosion indicator for vacuum tubes



3RT12 7 vacuum contactors, size S12
With lateral auxiliary switch block,
mounted overload relay and box terminals







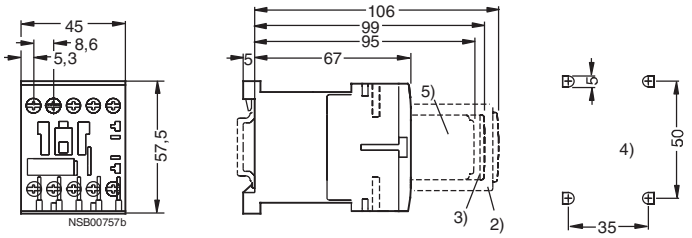
For sizes S10 and S12:

k = 150 mm (minimum clearance for removing the withdrawable coil)
1) 2nd auxiliary switch block, lateral
2) Position and contact erosion indicator
3) RC element
4) 3RB20 overload relay, mounted
5) Box terminal block (allen screw 6 mm)
6) PLC connection 24 V DC and changeover switch (for 3RT1…-.N)

Project planning aids

3RT13 and 3RT15 contactors, 4-pole

3RT13 1 and 3RT15 1 contactors, size S00,
Screw terminal
With surge suppressor and auxiliary switch block

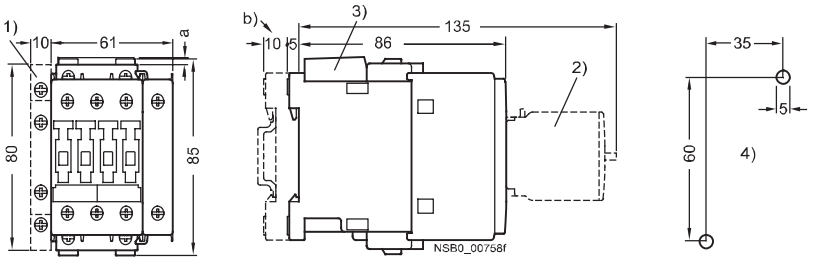


Lateral distance to
grounded components = 6 mm

For size S00:
Deviating dimensions for contactors
with Cage Clamp terminals:
Height: 60 mm
Mounting depth with auxiliary switch block:
110 mm

2) Auxiliary switch block
(also 3RH19 11-.N...
solid-state compatible version)
3) Surge suppressor
(also 3RT19 16-1GA00
additional load module)
4) Drilling pattern
5) Auxiliary switch block
1-pole

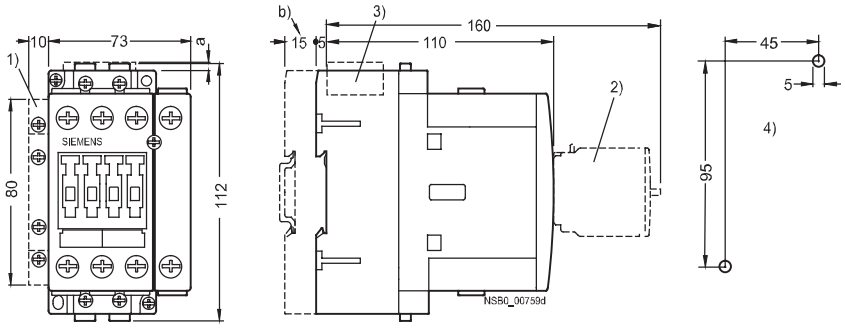
3RT13 2 and 3RT15 2 contactors, size S0
With surge suppressor and auxiliary switch block



For size S0:

a = 3 mm at < 250 V and mounting of surge suppressor
a = 7 mm at > 250 V and mounting of surge suppressor
b = DC 10 mm deeper than AC
1) Auxiliary switch block, laterally mountable (left)
2) Auxiliary switch block, mountable on the front
3) Surge suppressor
4) Drilling pattern

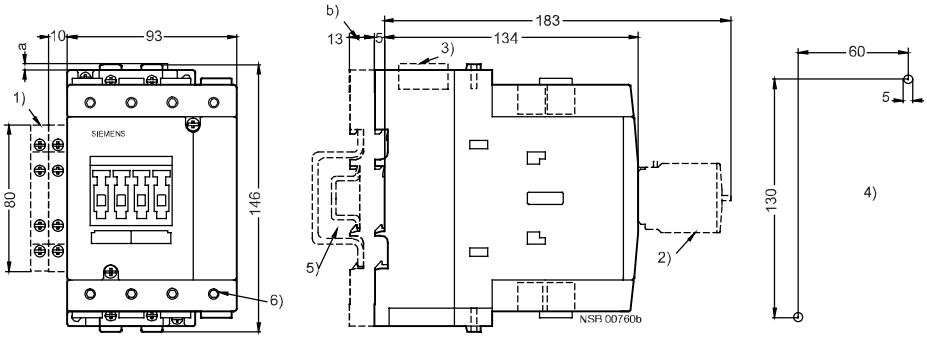
3RT13 3 and 3RT15 3 contactors, size S2
With surge suppressor and auxiliary switch block



For sizes S2 and S3:

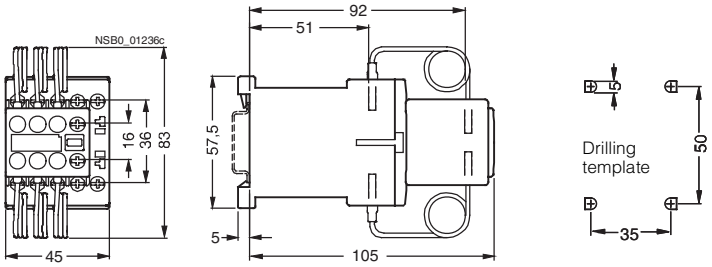
a = 0 mm with varistor < 240 V
a = 3.5 mm with varistor > 240 V
a = 17 mm with RC element and diode assembly
b = S2: DC 15 mm deeper than AC
S3: DC 13 mm deeper than AC
1) Auxiliary switch block, laterally mountable (right or left)
2) Auxiliary switch block, mountable on the front, (1, 2 and 4-pole, also 3RH19 21-1FE22 solid-state compatible version)
3) Surge suppressor
4) Drilling pattern
5) For mounting on 35 mm standard mounting rail (15 mm deep) acc. to EN 50022 or, in the case of size S3, 75 mm standard mounting rail according to EN 50023
6) Allen screw 4 mm

3RT13 4 contactors, size S3
With surge suppressor and auxiliary switch block

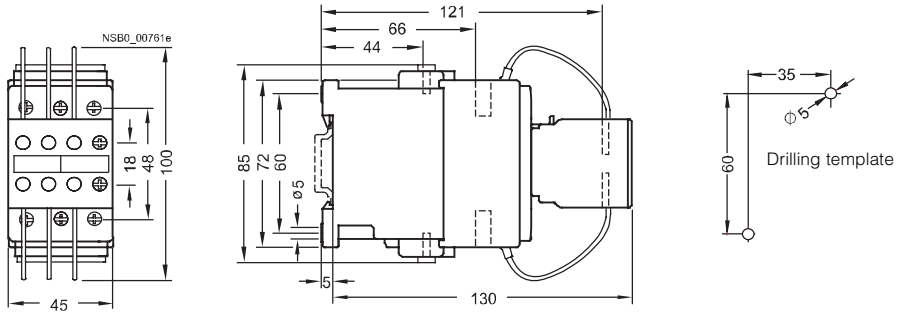


3RT16 capacitor contactors

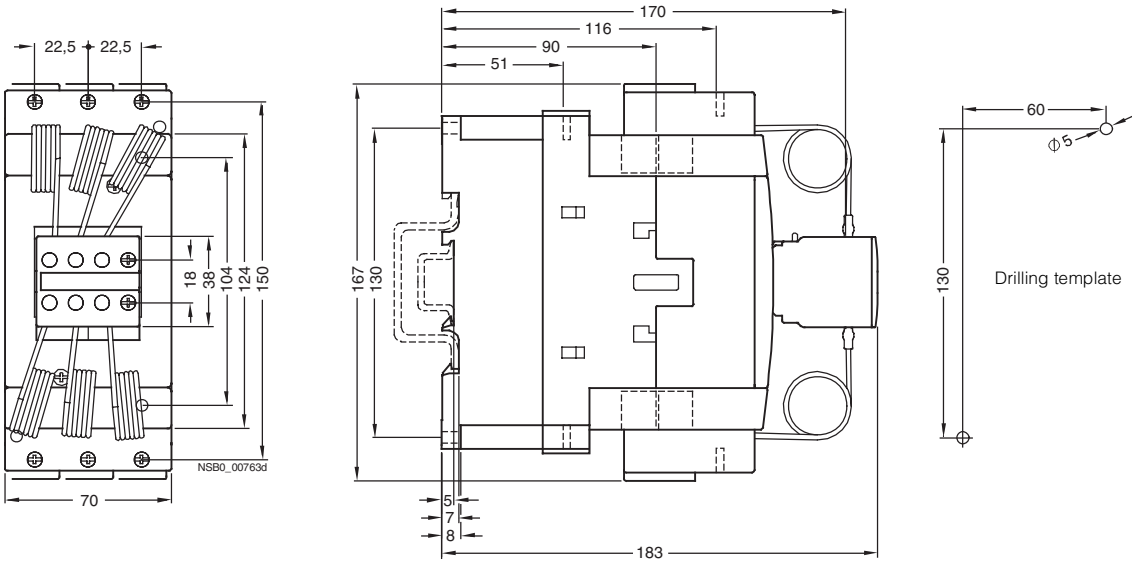
3RT16 17 capacitor contactors, size S00



3RT16 27 capacitor contactors, size S0



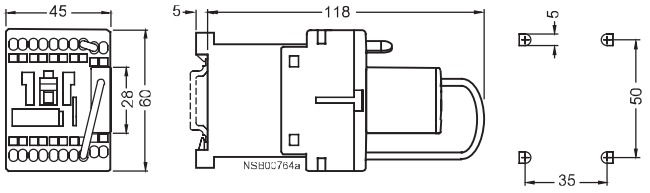
3RT16 47 capacitor contactors, size S3



Project planning aids

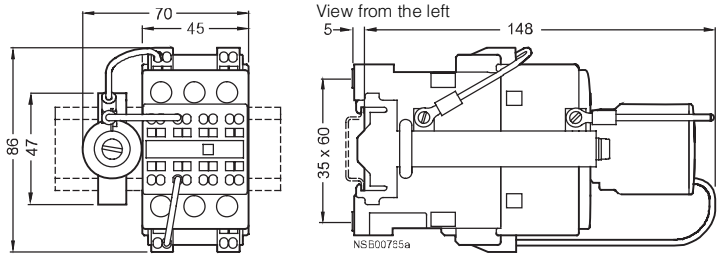
Contactors with extended operating range 0.7 to 1.25 x U_s

Size S00



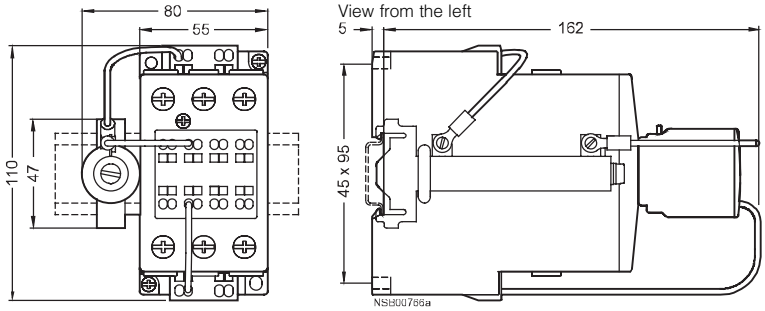
Without series resistor:
3RH11 22-2KB40
-2KF40
3RT10 17-2KB41
-2KF41
-2KB42
-2KF42
For dimensions see page 3/173 (size S00)

Size S0[1)]

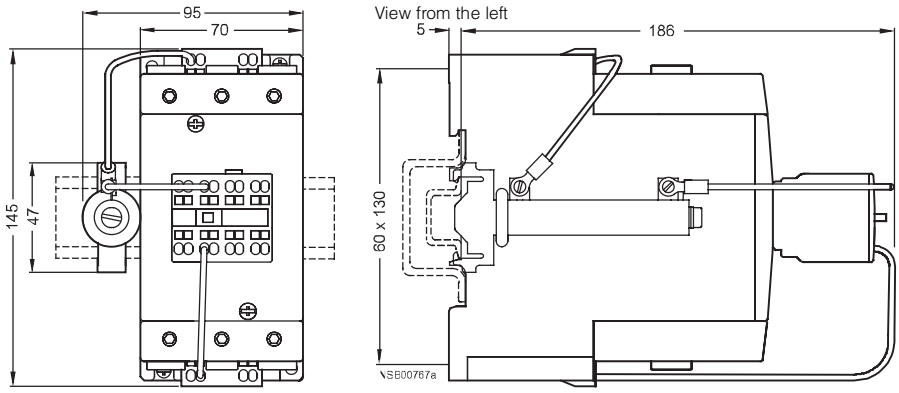


Without series resistor:
3RT10 25-3KB40
-3KF40
3RT10 26-3KB40
-3KF40
For dimensions see page 3/174 (size S0)

Size S2[1)]



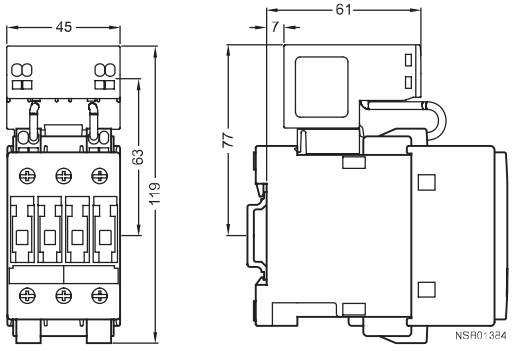
Size S3[1)]



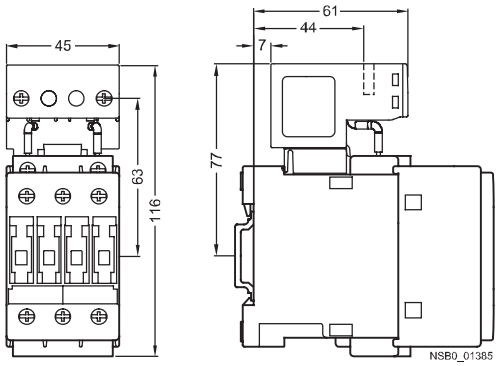
1) Sizes S0 to S3: Contactor series-resistor must be connected by customer.
The series resistor is equipped with the necessary connecting leads.

Contactors with extended operating range 0.7 to 1.25 x U_s

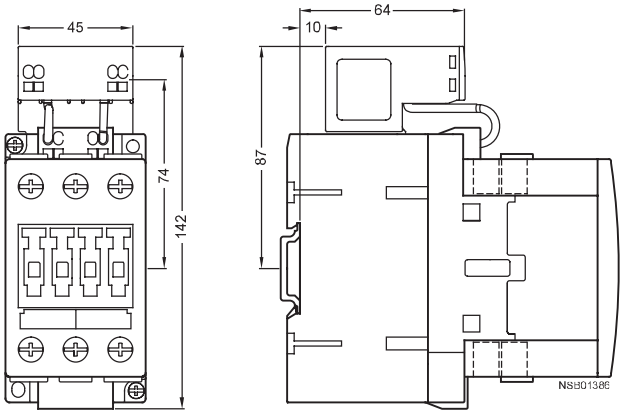
3RT10 2 -3X . 40-0LA2 contactors, size S0
Cage Clamp terminal



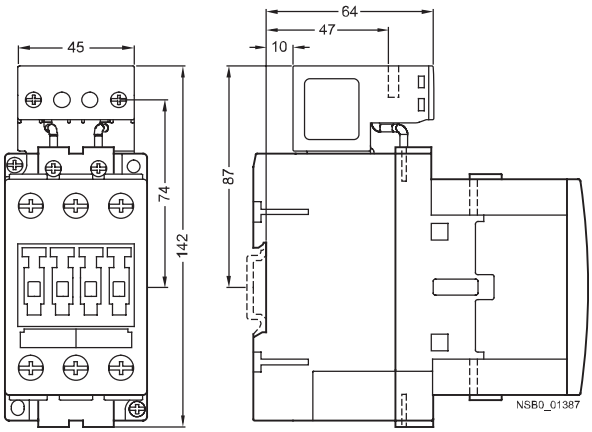
3RT10 2 -1X . 40-0LA2 contactors, size S0
Screw terminal



3RT10 3. -3X . 40-0LA2 contactors, size S2
Cage Clamp terminal



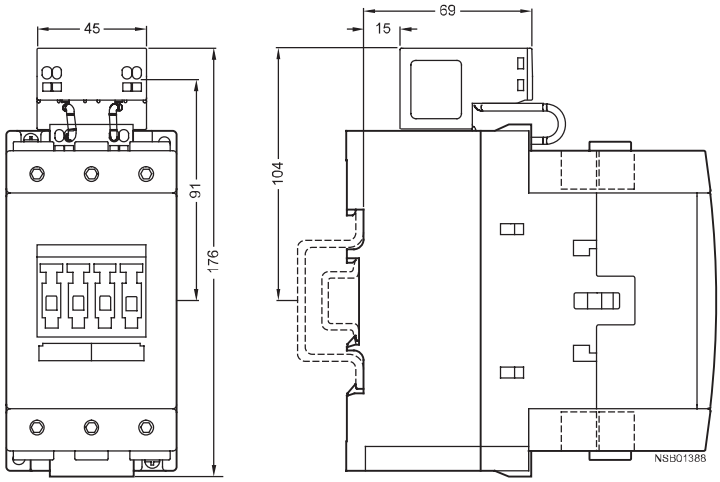
3RT10 3. -1X . 40-0LA2 contactors, size S2
Screw terminal



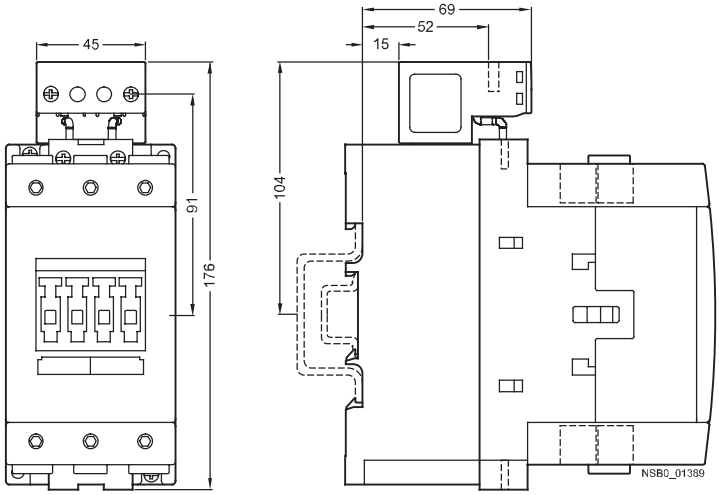
Project planning aids

Contactors with extended operating range 0.7 to 1.25 x U_s

3RT10 4. -3X . 40-0LA2 contactors, size S3
Cage Clamp terminal



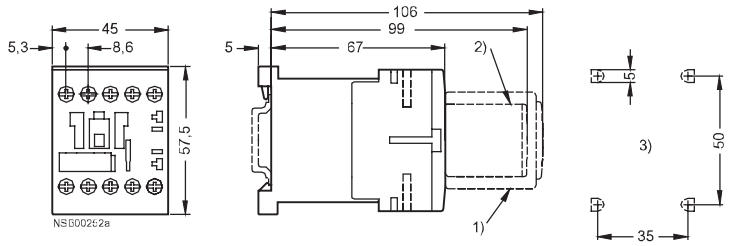
3RT10 4. -1X . 40-0LA2 contactors, size S3
Screw terminal



3RH11 and 3RH14 contactor relays

3RH11 contactor relays, size S00

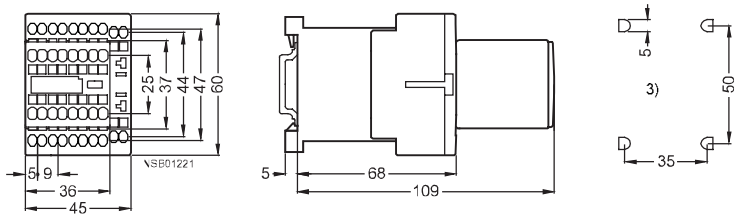
With screw terminals,
with surge suppressor and auxiliary switch block



Lateral distance to
grounded components = 6 mm

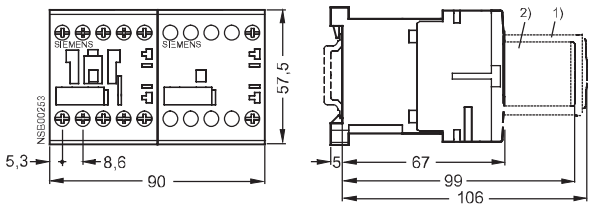
1) Auxiliary switch block
2) Surge suppressor
3) Drilling pattern

With Cage Clamp terminal,
with auxiliary switch block



3RH14 latched contactor relays, size S00

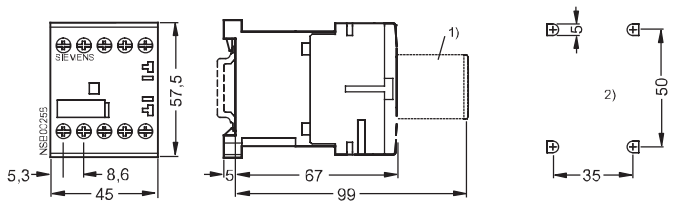
With surge suppressor and auxiliary switch block



3RH11 coupling relays

3RH11 coupling relays, size S00

With screw terminals,
with surge suppressor



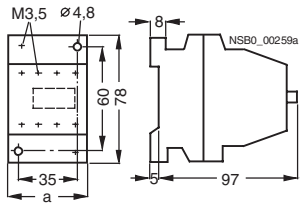
1) Surge suppressor
2) Drilling pattern

Deviating dimensions for coupling relays
with Cage Clamp terminals:
Height: 60 mm

Project planning aids

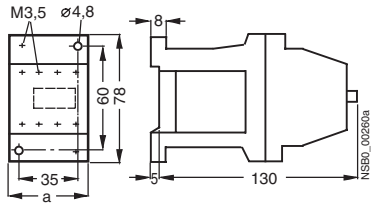
3TH42/3TH43

AC operation



Contactor type	a
3TH42	45
3TH43	55

DC operation

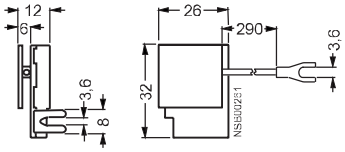


Contactor type	a
3TH42	45
3TH43	55

Accessories for 3TH42/3TH43 contactor relays

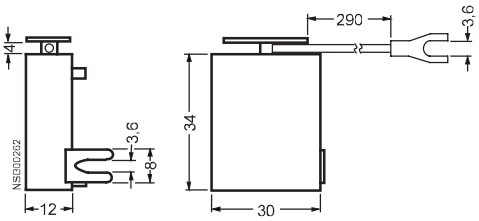
3TX7 402–3. varistors,
3TX7 402–3A noise suppression diode,
3TX7 402–3D diode assemblies

(for DC operation) for 3TH42/3TH43 contactor relays
For mounting onto the coil terminal



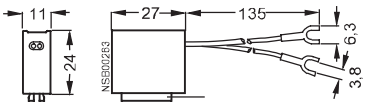
3TX7 402–3 RC elements

For 3TH42/3TH43 contactor relays for mounting onto the coil terminal



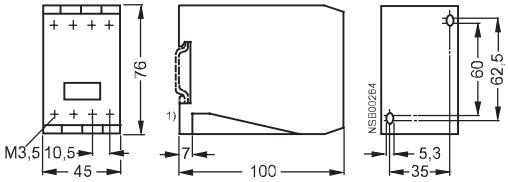
3TX4 180–0A ON-delay devices

For 3TH42/3TH43 contactor relays



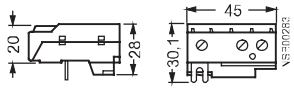
3TX4 701 OFF-delay devices

For 3TH42/3TH43 contactor relays



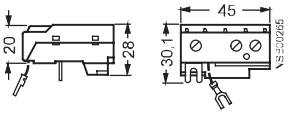
3TX4 090–0C interface

For mounting onto the contactor coil of 3TH42/3TH43 contactor relays, without surge suppression



3TX4 090–0D interface

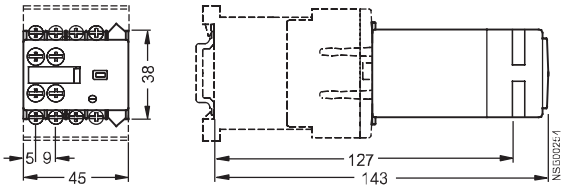
For mounting onto the contactor coil of 3TH42/3TH43, contactor relays with surge suppression



1) For 35 mm standard mounting rail.

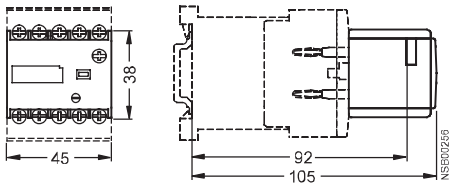
Accessories for 3RT1 contactors

3RT19 16-2E . . ., 3RT19 16-2F . . ., 3RT19 16-2G . . .
solid-state, time-delay auxiliary switch blocks
for contactors, size S00

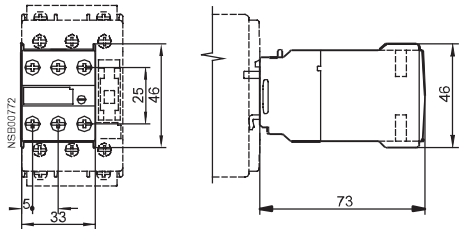


3RT19 16-2 . . . .
solid-state time-delay blocks, ON-delay
Size S00

For mounting onto the front of contactors
(the dimensions are also valid for time-delay blocks with an OFF-delay)

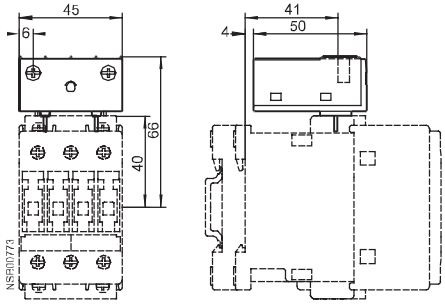


3RT19 26-2E . . ., 3RT19 26-2F . . ., 3RT19 26-2G . . .
solid-state, time-delay auxiliary switch blocks
for contactors, sizes S0 to S3

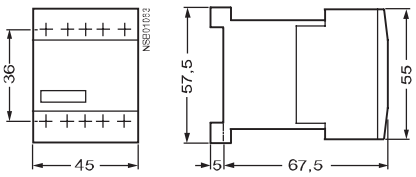


3RT19 26-2 . . . .
solid-state time-delay blocks, ON-delay
Sizes S0 to S3

For mounting onto the top of the contactors
(the dimensions are also valid for time-delay blocks with an OFF-delay and for 3RH19 24-1GP11 coupling links)

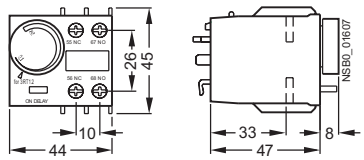


3RT19 16-2B.01
OFF-delay devices
for contactors, sizes S00 to S3



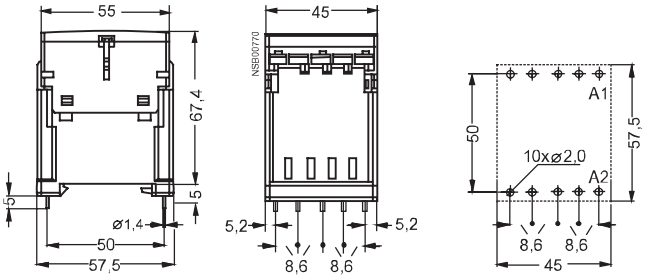
3RT19 26-2P..1
pneumatic delay block
for contactors, size S0

For mounting onto the front of 3RT1.2 contactors

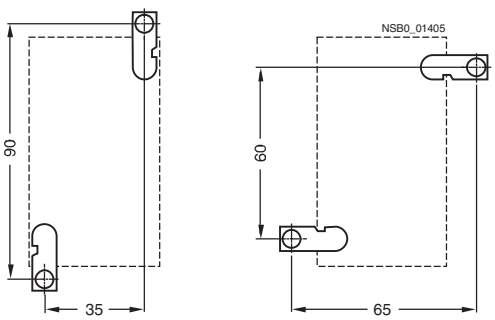


3RT19 16-4KA1
solder pin adapters
Size S00

Mounted onto 3RT10 1. contactors with 1 auxiliary contact in the basic unit



3RT19 26-4P
screw adapters
for contactor size S0

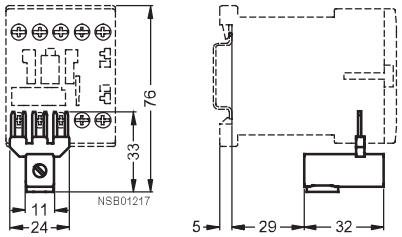


Project planning aids

Accessories for 3RT1 contactors

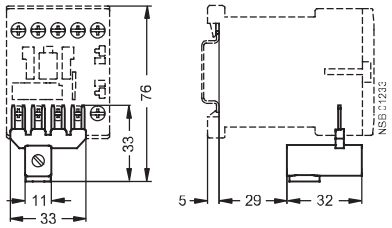
3RT19 16-4BB31
parallel connector
Size S00

3-pole, with terminal



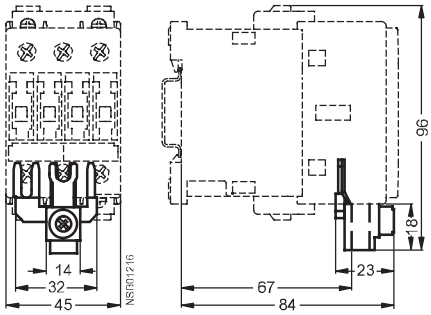
3RT19 16-4BB41
parallel connector
Size S00

4-pole, with terminal



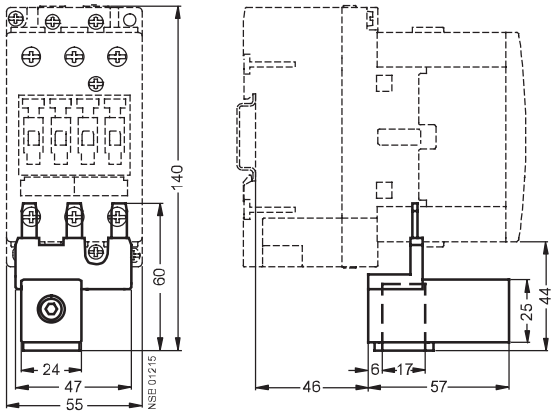
3RT19 26-4BB31
parallel connector
Size S0

3-pole, with terminal



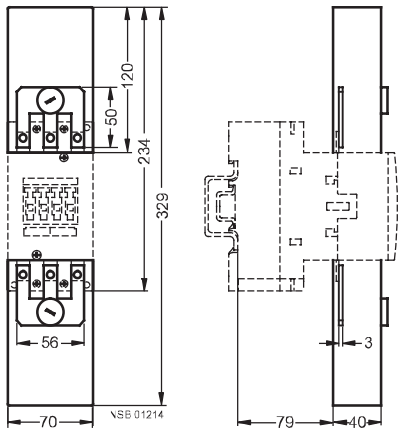
3RT19 36-4BB31
parallel connector
Size S2

3-pole, with terminal

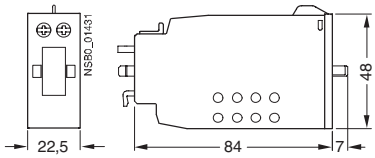


3RT19 46-4BB31
parallel connector
Size S3

3-pole, with through hole and cover for shock protection

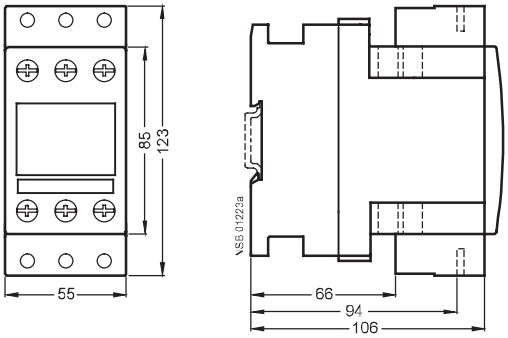


3RT19 26-3A.
mechanical latching block

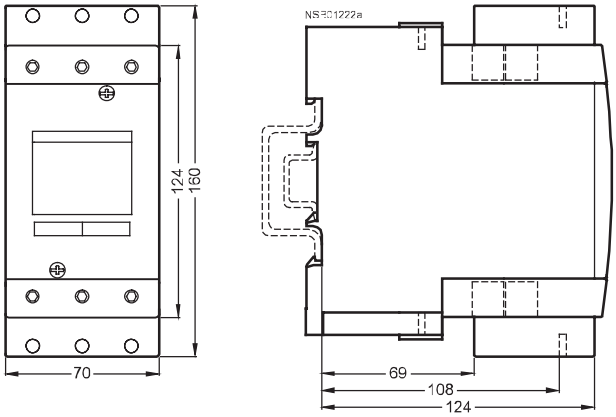


Accessories for 3RT1 contactors

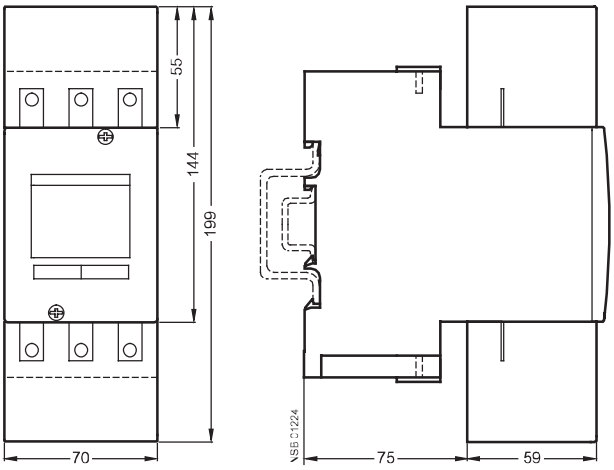
3RT19 36-4EA2
terminal cover for box terminals
for size S2



3RT19 46-4EA2
terminal cover for box terminals
for size S3



3RT19 46-4EA1
terminal cover for cable lug and bar connection
for size S3

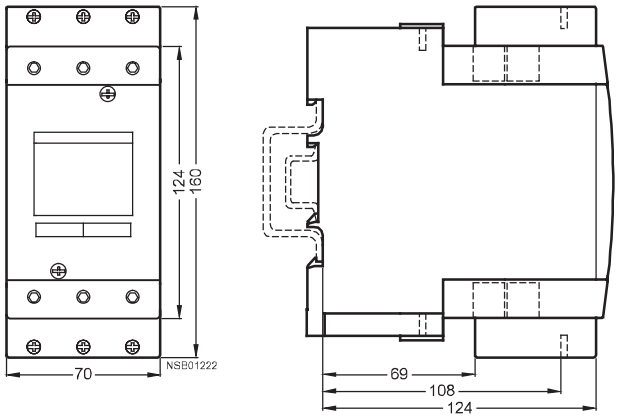


Project planning aids

Accessories for 3RT1 contactors

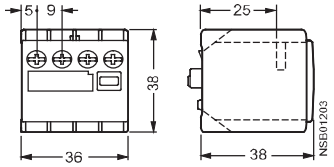
3RT19 46-4F
auxiliary conductor terminal, 3-pole
Size S3

Mounted on contactor



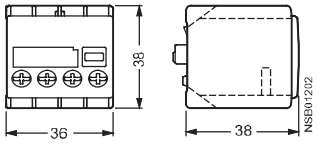
3RH19 11-1AA . ., 3RH19 11-1LA . .
auxiliary switch block
for size S00

Screw terminal
2-pole
Cable entry from above



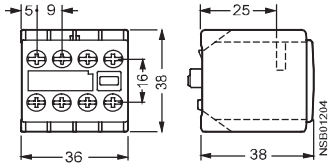
3RH19 11-1BA . ., 3RH19 11-1MA . .
auxiliary switch block
for size S00

Screw terminal
2-pole
Cable entry from below



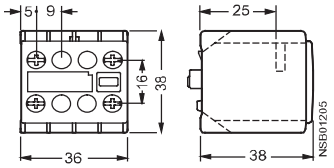
3RH19 11-1F . ., 3RH19 11-1H . .
auxiliary switch block according to EN 50012 and EN 50005
for size S00

Screw terminal
1- to 4-pole



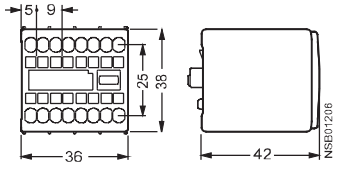
3RH19 11-. NF . .
solid-state compatible auxiliary switch block according to EN 50005
for size S00

Screw terminal[1)]



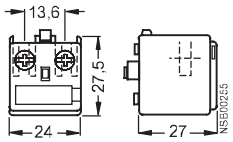
3RH19 11-2F . . ., 3RH19 11-2H . . .
auxiliary switch block according to EN 50005 and EN 50012
for size S00

Cage Clamp terminal
1- to 4-pole



3RH19 11-1AA.., 3RH19 11-1BA..
auxiliary switch block, 1-pole
Size S00

Cable entry from one side

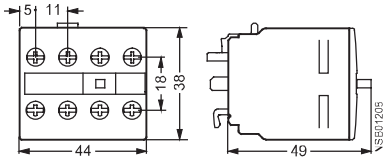


1) Deviating dimension for auxiliary switch block with Cage Clamp terminal:
Mounting depth 42 mm.

Accessories for 3RT1 contactors

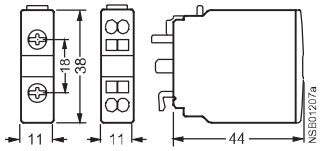
3RH19 21- . HA . ., 3RH19 21- . F . . .
auxiliary switch block according to EN 50005 and EN 50012
for sizes S0 to S12

Screw and Cage Clamp terminals
4-pole



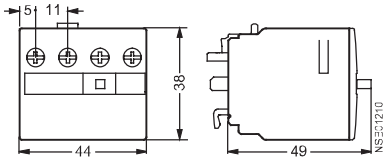
3RH19 21- . C . . .
auxiliary switch block according to EN 50005 and EN 50012
for sizes S0 to S12

Screw and Cage Clamp terminal
1-pole



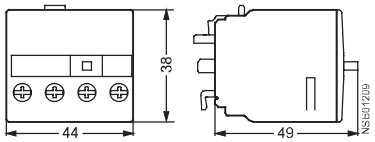
3RH19 21-1LA . .
auxiliary switch block according to EN 50005
for sizes S0 to S12

Screw terminal
2-pole
Cable entry from above



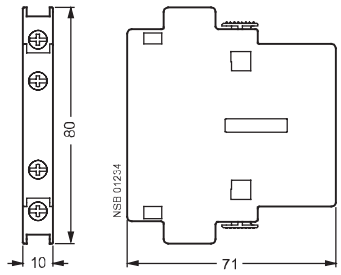
3RH19 21-1MA . .
auxiliary switch block according to EN 50005
for sizes S0 to S12

Screw terminal
2-pole
Cable entry from below



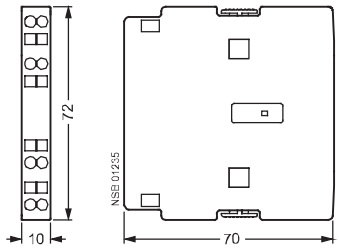
3RH19 21-1D . . ., 3RH19 21-1J . . ., 3RH19 21-1E . . ., 3RH19 21-1K . . .
auxiliary switch block, laterally mountable,
for sizes S0 to S12

Screw terminal
2-pole



3RH19 21-2D . . ., 3RH19 21-2J . . ., 3RH19 21-2E . . ., 3RH19 21-2K . . .
auxiliary switch block, laterally mountable,
for sizes S0 to S12

Cage Clamp terminal
2-pole

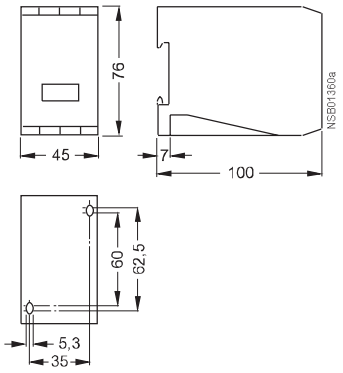


Project planning aids

Accessories for 3RT1 contactors

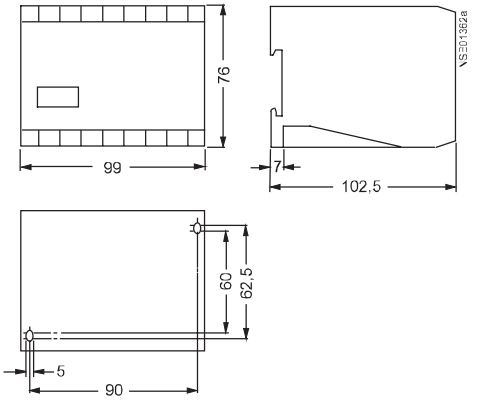
3RT19 66-1PV3
main circuit damping module
for 3RT12 vacuum contactors, sizes S10 and S12

Connected to outgoing side of contactor (2-T1/4-T2/6-T3)
using approx. 350 mm long, molded cable



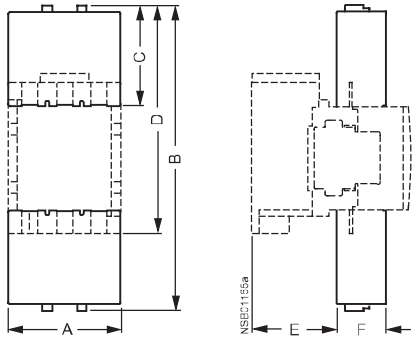
3RT19 66-1PV4
main circuit damping module
for 3RT12 vacuum contactors, sizes S10 and S12

Connected to outgoing side of contactor (2-T1/4-T2/6-T3)
using approx. 350 mm long, molded cable



3RT19 .6-4EA1
terminal cover for bar connection
Sizes S6 to S12

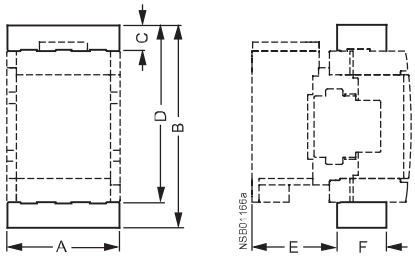
For mounting onto the contactor enclosure



	A	B	C	D	E	F
S6	119	324	107	241	91	52
S10	145	385	128	289	106	66
S12	145	399	128	303	124	66

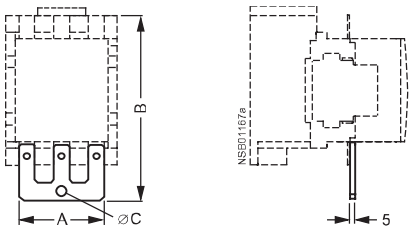
3RT19 .6-4EA2
terminal cover for box terminals
Sizes S6 to S12

For mounting onto box terminal



	A	B	C	D	E	F
S6	119	215	27	190	91	52
S10	145	265	30	235	106	66
S12	145	279	30	249	124	66

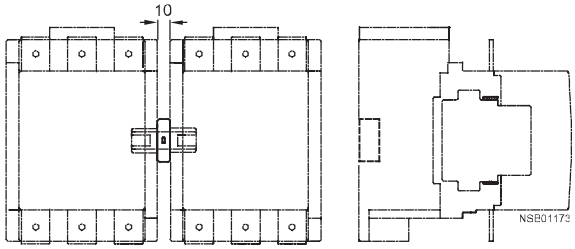
3RT19 .6-4BA31
links for paralleling
Sizes S6 to S12



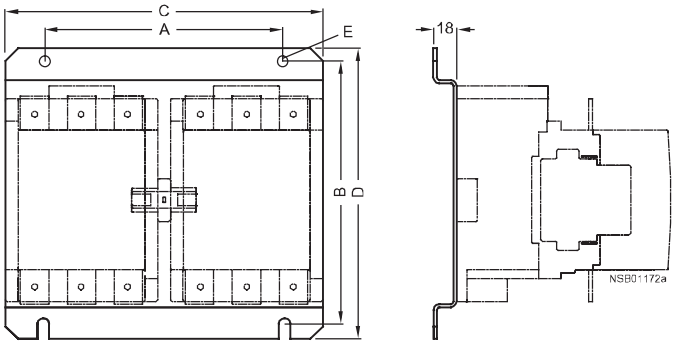
	A	B	⌀C
S6	91	199	10.5
S10	121	244	12.5
S12	121	258	12.5

Accessories for 3RA1 contactor assemblies

3RA19 54-2A
mechanical interlock
Sizes S6 to S12

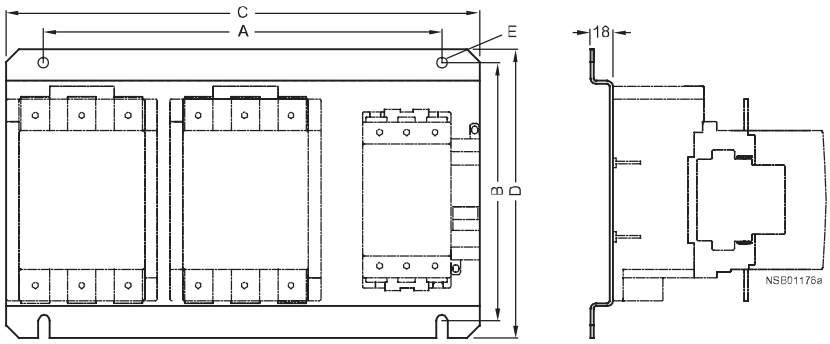


3RA19.2-2A base plates for reversing contactor assemblies



	A	B	C	D	E
S6	190	205	250	229	9
S10	240	249	300	275	11
S12	280	249	330	275	11

3RA19.2-2E, 3RA19.2-2F base plates for wye-delta assemblies

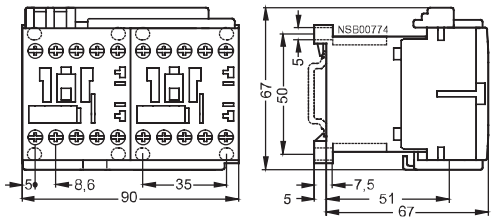


	A	B	C	D	E
S6-S6-S3	316	205	376	229	9
S6-S6-S6	343	205	403	229	9
S10-S10-S6	393	250	453	275	11
S10-S10-S10	423	250	483	275	11
S12-S12-S10	450	250	510	275	11
S12-S12-S12	465	250	525	275	11

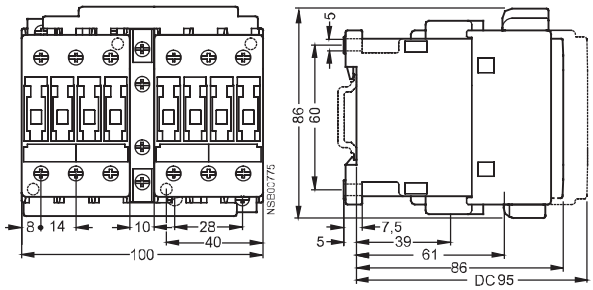
Project planning aids

3RA13 reversing contactor assemblies

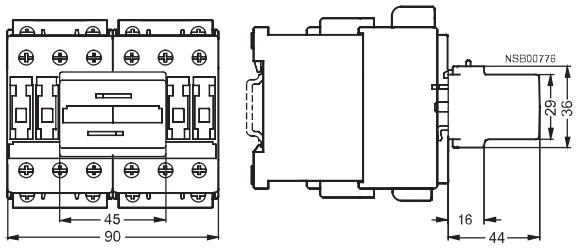
Size S00



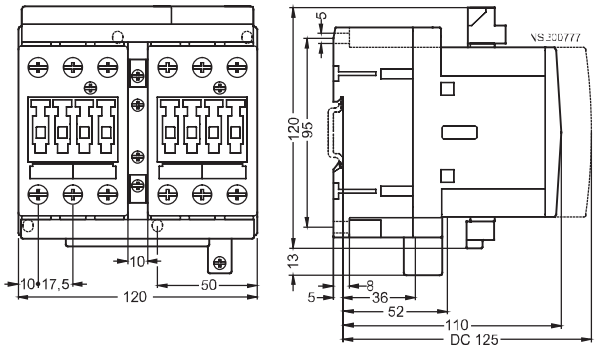
Size S0
With 3RA19 24-2B mechanical interlock
Laterally mountable



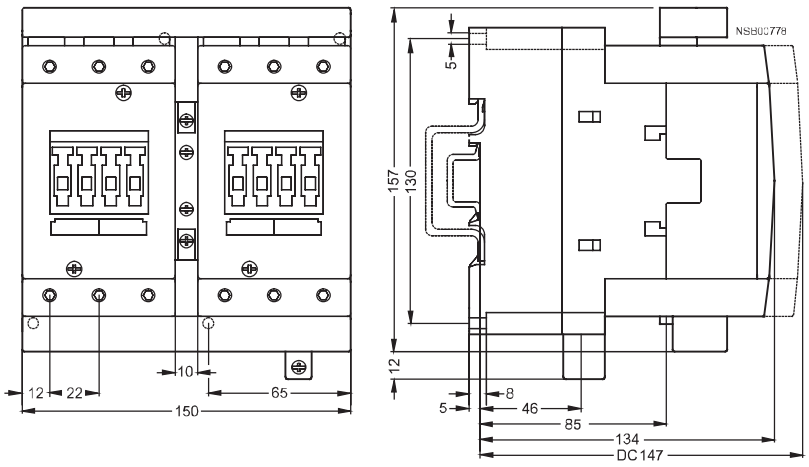
With mechanical interlock 3RA19 24-1A
On front



Size S2

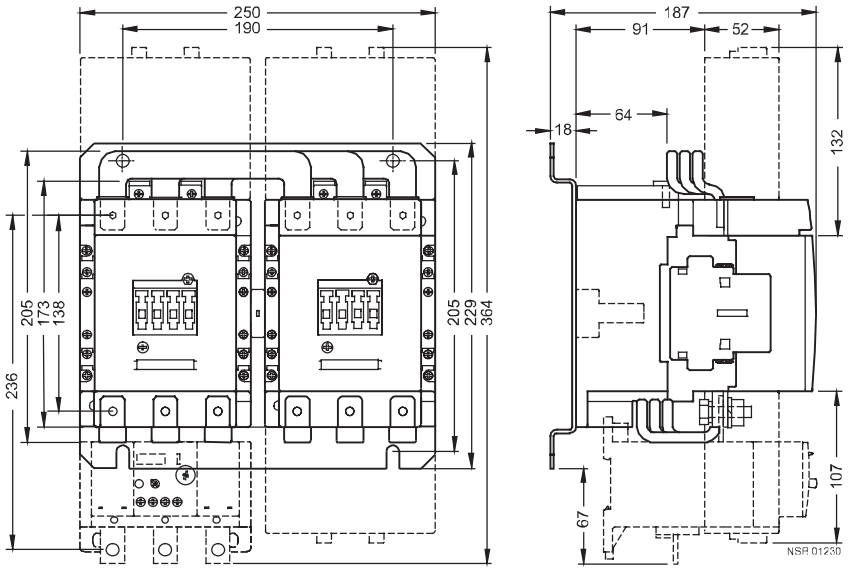


Size S3

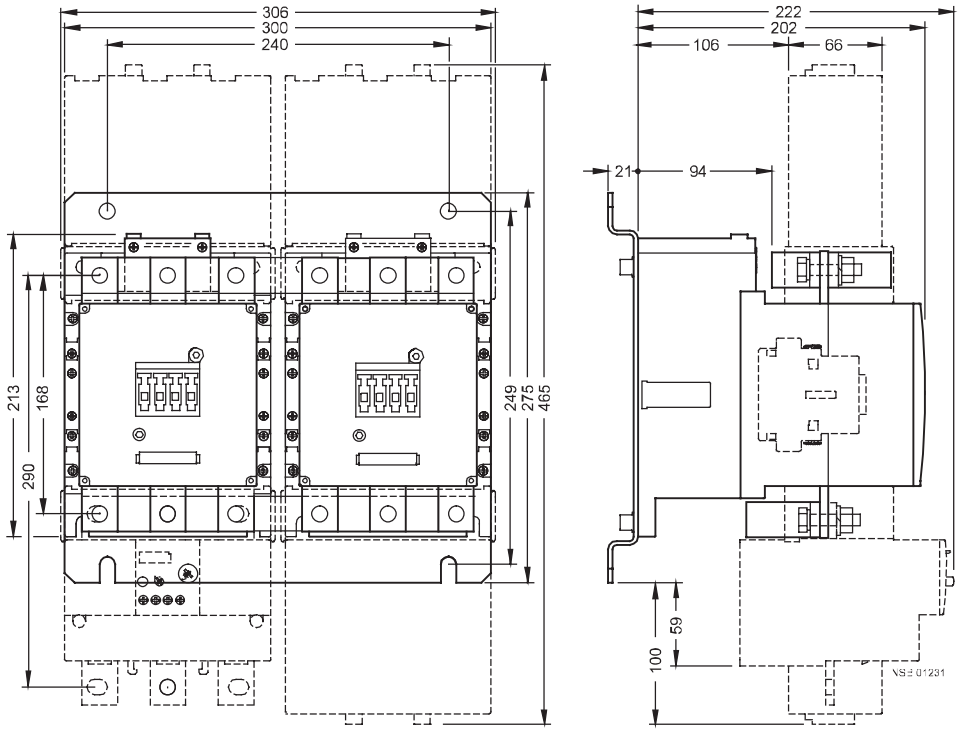


3RA13 reversing contactor assemblies

Size S6



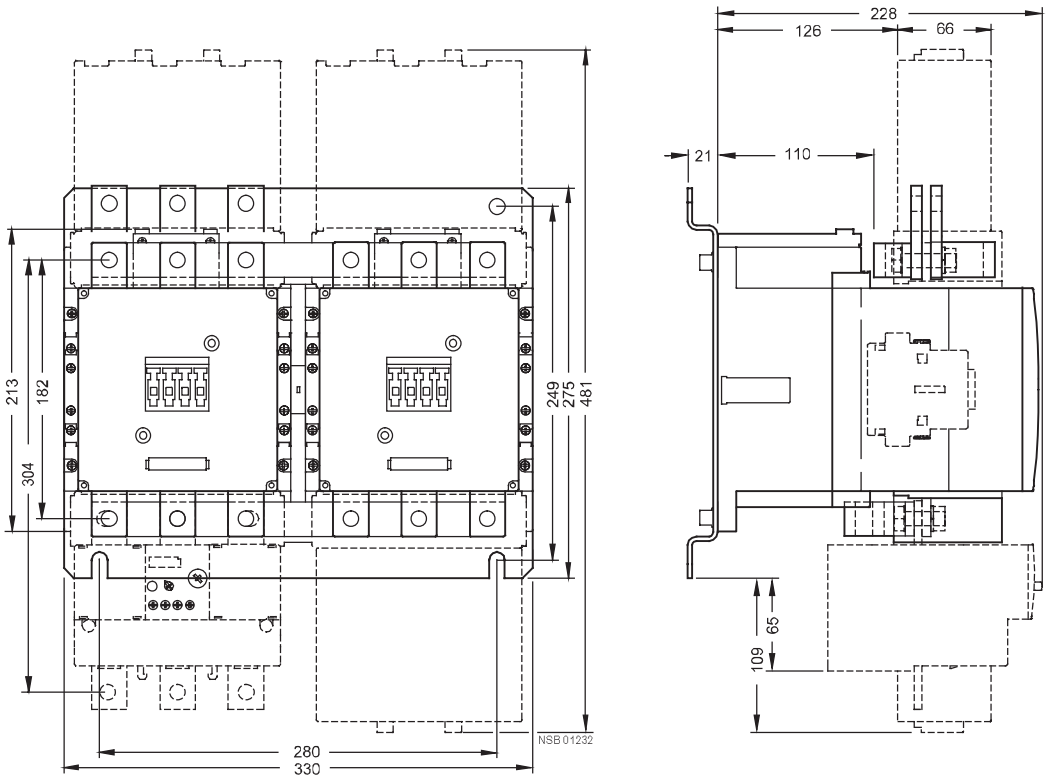
Size S10



Project planning aids

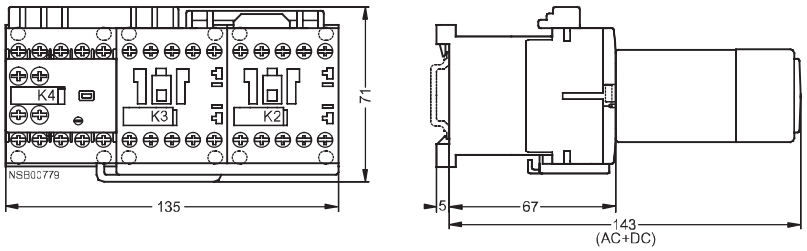
3RA13 reversing contactor assemblies

Size S12

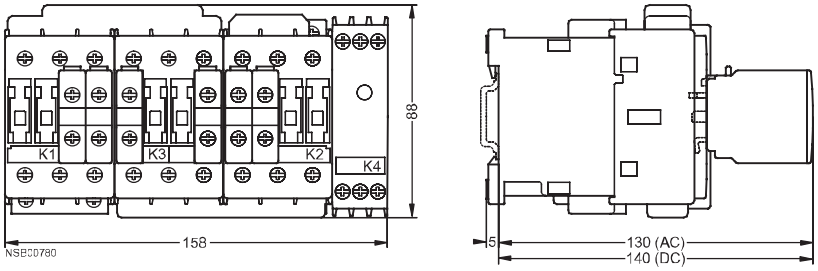


3RA14 contactor assemblies for wye-delta starting

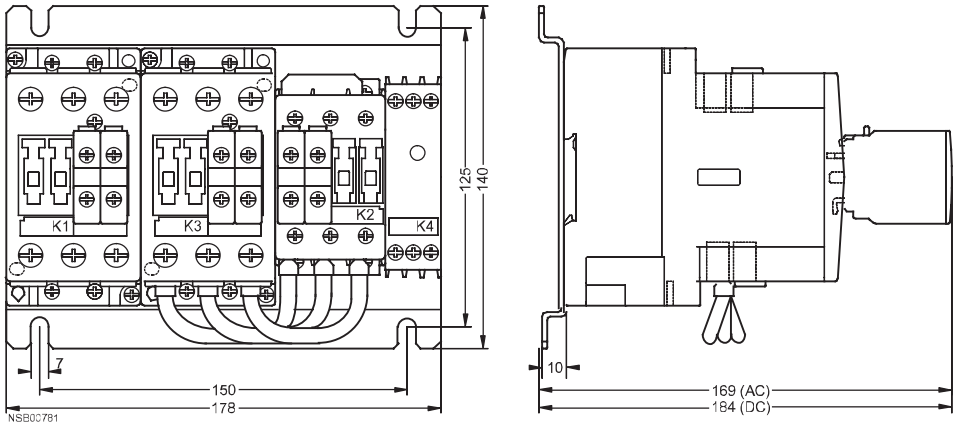
Sizes S00 – S00 – S00



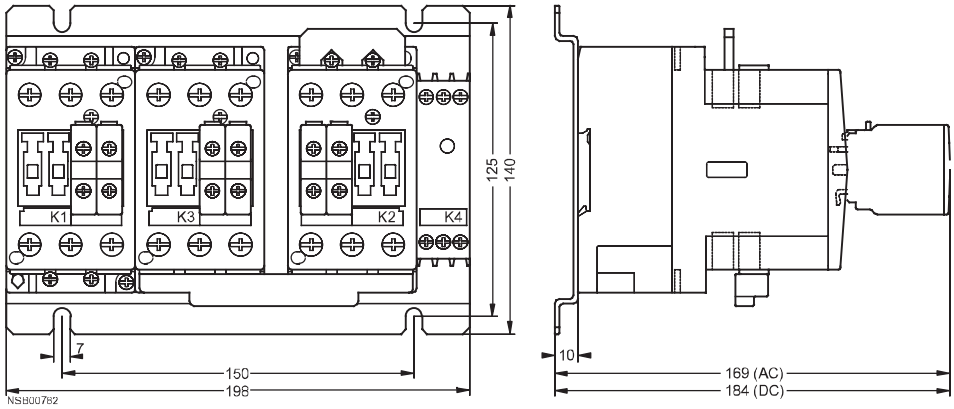
Sizes S0 – S0 – S0



Sizes S2 – S2 – S0



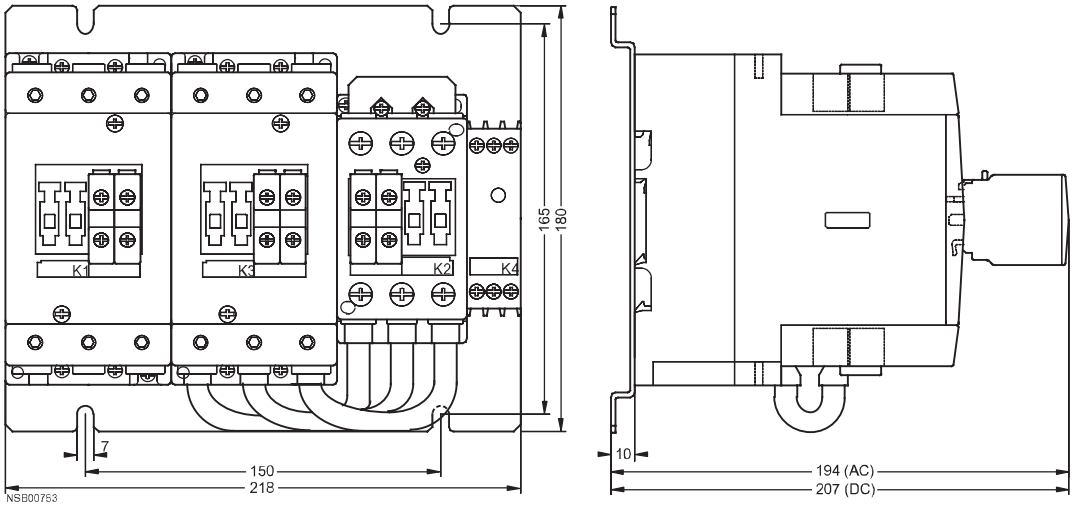
Sizes S2 – S2 – S2



Project planning aids

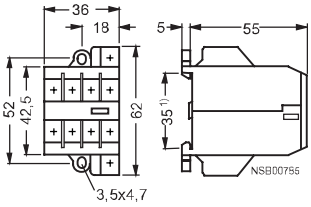
3RA14 contactor assemblies for wye-delta starting

Sizes S3 – S3 – S2

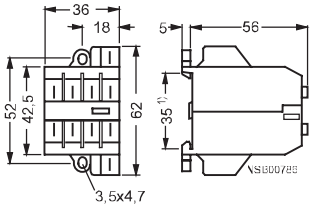


3TG10 miniature contactors

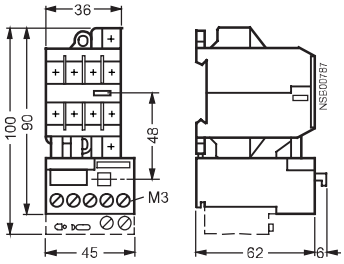
3TG10 ..-0.. contactors
With screw terminals



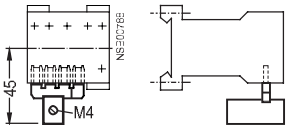
3TG10 ..-1.. contactors
With tab connectors



3TG10 contactors
With 3UA7 overload relay



3RT19 16-4BB41 parallel connections, 4-pole, with connection terminal for 3TG10 contactors

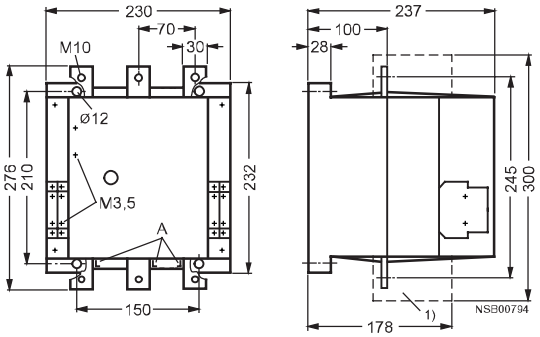


The parallel connections can be reduced by one pole.

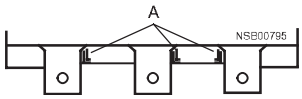
1) Can be snapped onto 35 mm standard mounting rail.

3TF68 and 3TF69 vacuum contactors, 3-pole

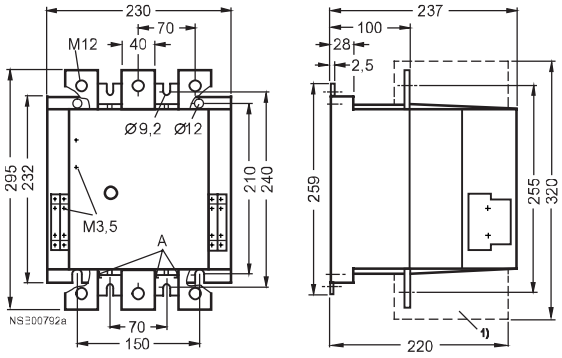
3TF68 vacuum contactors



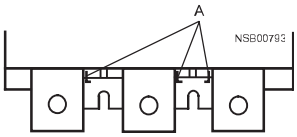
Detail
A = Contact erosion indicator for vacuum interrupter contacts



3TF69 vacuum contactors



Detail
A = Contact erosion indicator for vacuum interrupter contacts

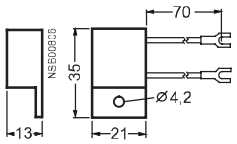


1) With box terminals for laminated copper bars (accessories).

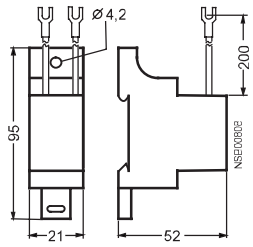
Project planning aids

Accessories for 3T contactors

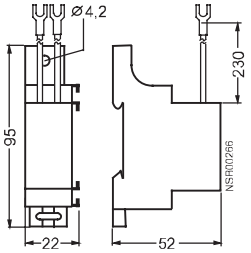
3TX7 462-3. varistors



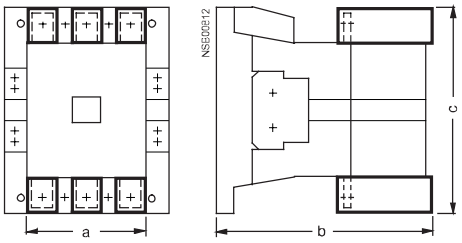
3TX7 462-3., 3TX7 522-3.,
3TX7 572-3.
RC elements and varistors



3TX7 090-0D coupling relay
For laterally snapping onto contactors

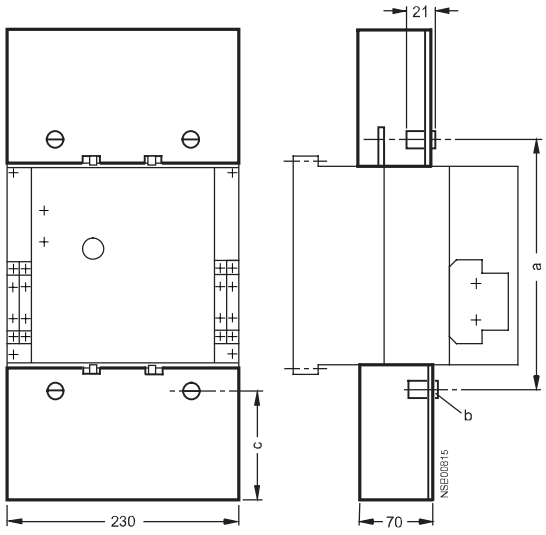


3TX7 box terminals for laminated copper bars
Box terminals with cover, mounted to contactor



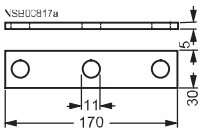
For contactor type	Box terminal	a	b	c
3TF68	3TX7 570-1.	182	178	300
3TF69	3TX7 690-1F	200	219	320

3TX7 686-0A and 3TX7 696-0A extended terminal covers
For 3TF68 and 3TF69 contactors, size 14,
mountable to free screw end of the two outer conducting paths

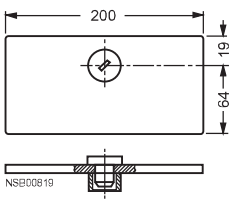


For contactor type	Terminal covers	a	b	c
3TF68	3TX7 686-0A	245	M10	104
3TF69	3TX7 696-0A	255	M12	99

3TX7 680-0D parallel connection
For 3TF68 contactors

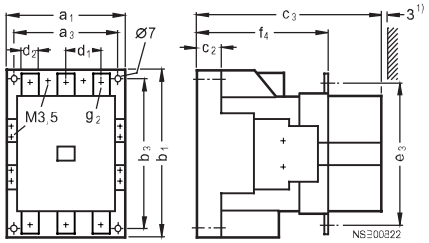


3TX7 680-0E cover plate
For 3TX7 680-0D parallel connection for 3TF68 contactor



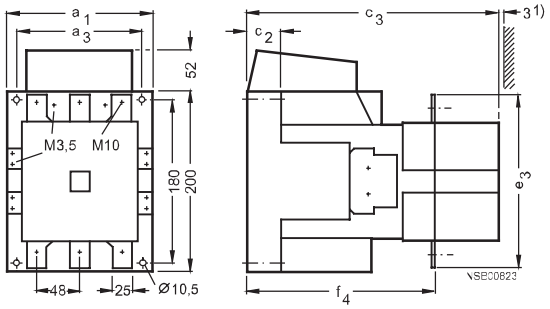
3TB5 contactors

3TB50 and 3TB52 contactors
Sizes 6 and 8



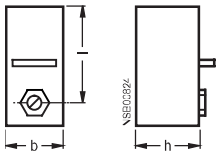
Type	a_1	a_3	b_1	b_3	c_2	c_3	d_1	d_2	e_3	f_4	g_2
3TB50	120	100	150	130	23	198	37	15	133	137.5	M6
3TB52	135	110	180	160	28	217	42	20	154	147	M8

3TB54 and 3TB56 contactors
Sizes 10 and 12



Type	a_1	a_3	c_2	c_3	e_3	f_4
3TB54	145	120	30.5	264	168	188
3TB56	160	130	39	282	178	200

3TX6 . . 6-3B terminal covers

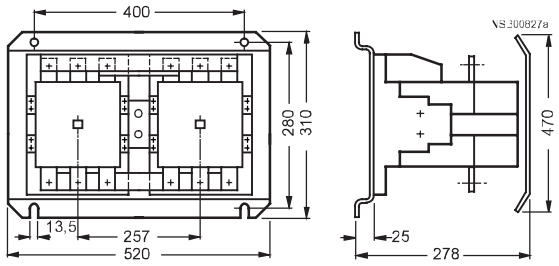


For contactor Size	Type	b	h	l
6	3TB50	27	33	58
8	3TB52	34	44	75
10 up to 12	3TB54 to 3TB56	38	56	95

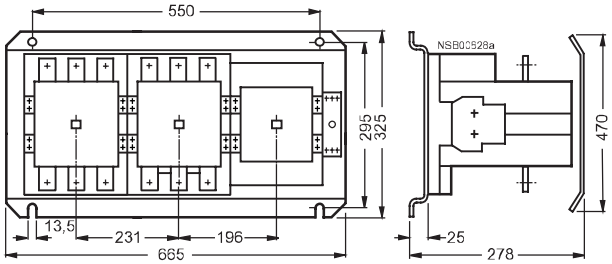
1) Minimum clearance from insulated components 3 mm.
Minimum clearance from grounded components 10 mm.

3TD68, 3TE68 contactor assemblies

3TD68 contactor assemblies



3TE68 contactor assemblies

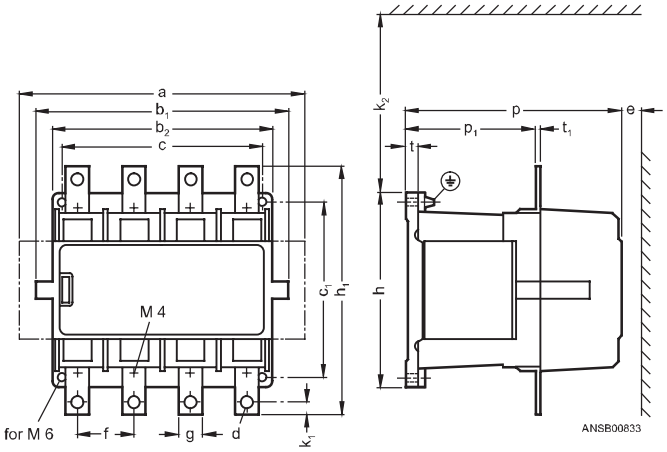


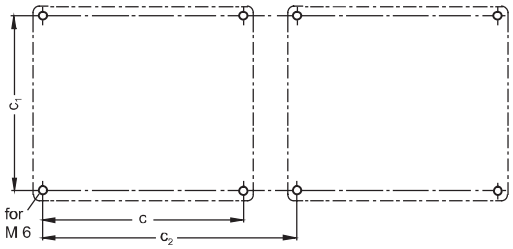
Project planning aids

3TK10 to 3TK17 contactors

3TK10 to 3TK17 contactors
The scope of supply includes screws and rubber buffers.

⏚ M10 grounding screw for 3TK14 to 3TK17





Contactor Type	a	b_1	b_2	c	c_1	c_2 [1]	c_2 [2]	d [3]	e min.	f	g	h	h_1	k_1	k_2 [4]	p	p_1	t	t_1
3TK10	186	165	136	120	140	166	187	6.6	40	41	15	156	156	7.5	134	154.5	102.3	10	4
3TK11	186	165	136	120	140	168	187	11	40	42	20	156	172	10	134	154.5	102.3	10	4
3TK12	225	201	176	160	140	202	226	11	15	45	20	156	198	10	134	172	106.7	10	5
3TK13	225	201	176	160	140	202	226	11	15	45	20	156	198	10	134	172	106.7	10	5
3TK14	266	244	244	220	200	271	293	11	40	67	25	223	272	12.5	--	225.5	139.5	23 [5]	6
3TK15	266	244	244	220	200	271	293	11	40	67	25	223	273	12.5	--	225.5	139.5	23 [5]	6
3TK17	266	244	244	220	200	271	293	11	40	67	40	223	273	12.5	--	225.5	139.5	23 [5]	6

1) Clearance when 2 contactors, each with one auxiliary switch block opposite, are mounted.

2) Clearance when 2 contactors, each with two auxiliary switch blocks opposite, are mounted.

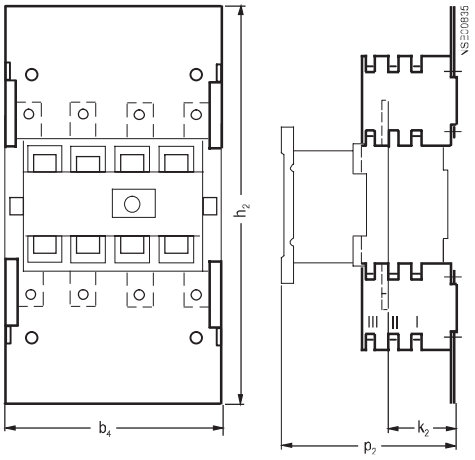
3) Nuts, bolts, screws and washers are supplied.

4) Minimum clearance for removing the withdrawable coil.

5) Damping elements are supplied.

Accessories for 3TK1 contactors

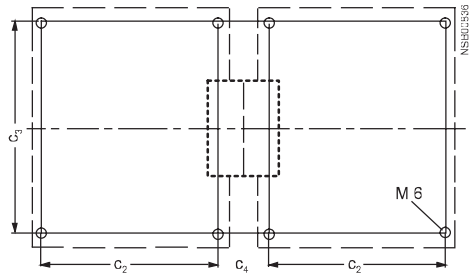
3TK19 4. terminal cover



Contactor Type	Terminal covers	h_2	p_2 for			k_2 for			b_4
			I	II	III	I	II	III	
3TK10, 3TK11	3TK19 40-0A	372	153	178	203	47	72	97	168
3TK12, 3TK13	3TK19 42-0A	399	158	183	208	47	72	97	202
3TK14, 3TK15	3TK19 44-0A	464	193	218	243	47	72	97	268
3TK17	3TK19 46-0A	464	193	218	243	47	72	97	268

3TK19 20 and 3TK19 22 locking devices

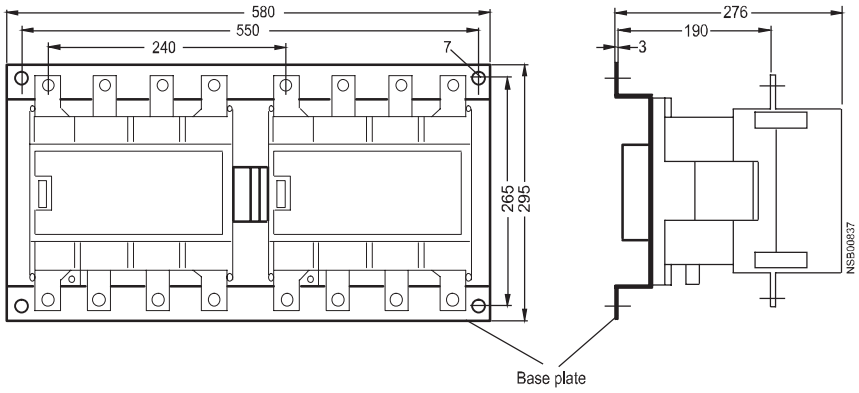
For mechanical locking of two identical 3TK10 to 3TK13 contactors, mounted side by side on the mounting plate



Contactor Type	Locking device	c_2	c_3	c_4
3TK10, 3TK11	3TK19 20-0A	120	140	65
3TK12, 3TK13	3TK19 22-0A	160	140	63.5

3TK19 24 locking device

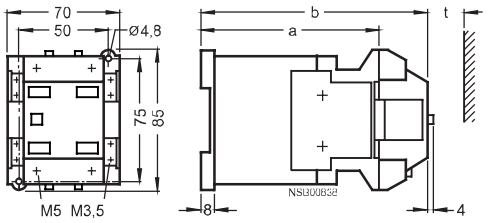
For mechanical locking of two identical 3TK14, 3TK15 or 3TK17 contactors, mounted side by side on the mounting plate



Project planning aids

3TC4 and TC5 contactors

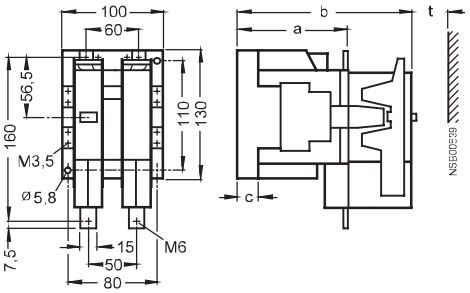
3TC44 contactors
Size 2, AC and DC operation



t = minimum clearance from insulated components: 15 mm (600 V and 750 V)
from grounded components: 30 mm (600 V and 750 V)

	a	b
DC operation	109	141
AC operation	68	100

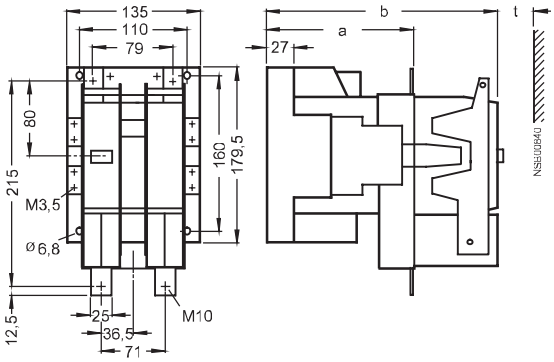
3TC48 contactors
Size 4, AC and DC operation



t = minimum clearance from insulated components: 15 mm (600 V),
20 mm (750 V)
from grounded components: 35 mm (600 V),
55 mm (750 V)

	a	b	c
DC operation	112	180	21.5
AC operation	86	154	23.5

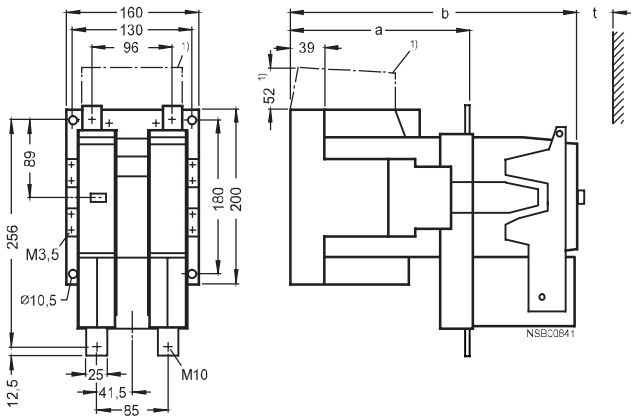
3TC52 contactors
Size 8, AC and DC operation



t = minimum clearance from insulated components: 20 mm (600 V and 750 V)
from grounded components: 70 mm (600 V and 750 V)

	a	b
DC operation	147	232
AC operation	115	200

3TC56 contactors
Size 12, AC and DC operation



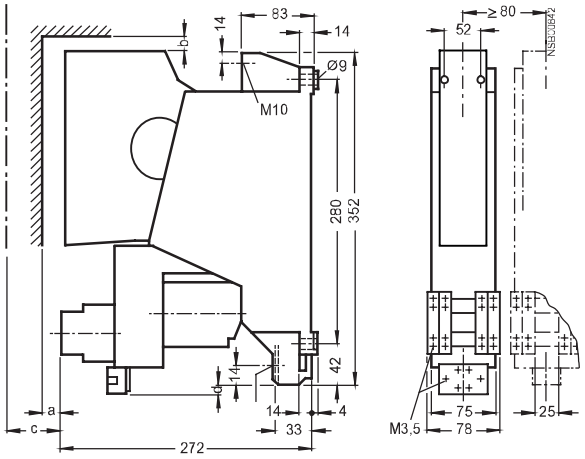
t = minimum clearance from insulated components: 25 mm (600 V and 750 V)
from grounded components: 80 mm (600 V),
100 mm (750 V)

	a	b
DC operation	200	310
AC operation	141	251

1) DC operation only.

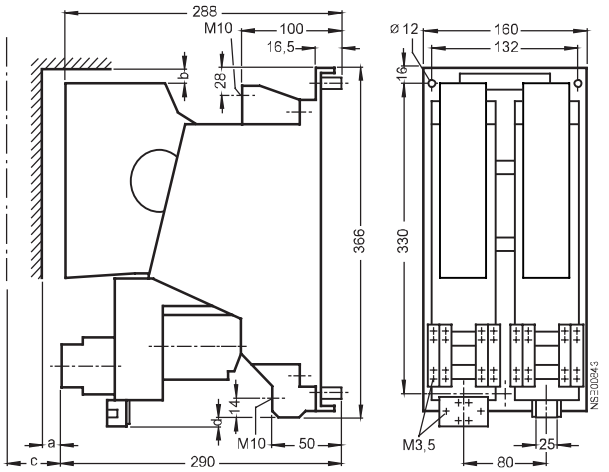
3TC7 contactors

3TC74 contactors
Size 12, DC and AC operation



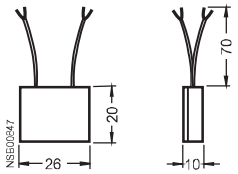
Dimensions	Minimum clearance from insulated components	grounded components
a	≥ 20	≥ 50
b	≥ 10	≥ 25
c	≥ 180 (clearance for removing arc chute)	

3TC78 contactors
Size 12, DC and AC operation



Dimensions	Minimum clearance from insulated components	grounded components
a	≥ 20	≥ 50
b	≥ 10	≥ 25
c	≥ 180 (clearance for removing arc chute)	
d	Coil connection 3TC78 14-0E: 8 mm 3TC78 14-1C: 16 mm	

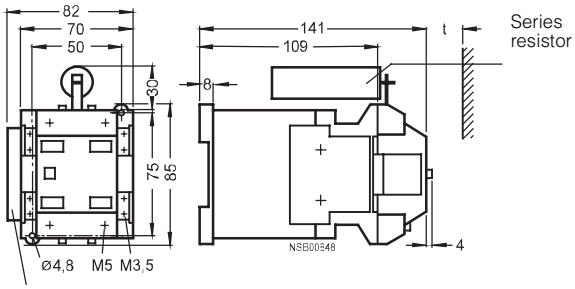
3TX2 746-2. varistors
For 3TC74 and 3TC78 contactors



Project planning aids

Contactors with extended tolerance 0.7 to 1.25 x U_s

3TC44 17-0L contactors, size 2, DC operation

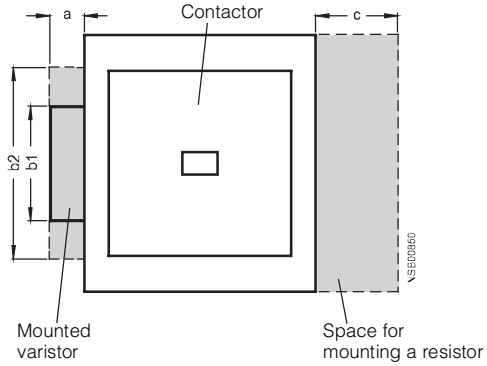


Varistor

t = minimum clearance from insulated components: 15 mm (600 V and 750 V)
from grounded components:30 mm (600 V and 750 V)

Additional space requirements for mounting resistors and varistors

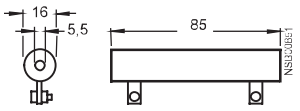
For 3TB50 to 3TB56, 3TC48 to 3TC56 contactors



For contactor	Additional space requirements for series resistor	for varistor		
	c	a	b_1	b_2*)
3TB50	30	13	70	110
3TB52, 3TB54, 3TB56	--	15	82	120
3TC48	30	13	70	110
3TC52, 3TC56	--	15	82	120

*) terminal compartment

Separately mounted series resistor

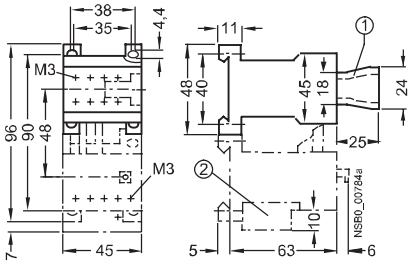


For contactor	Number of series resistors
3TB52, 3TC52	1
3TB54, 3TB56	2
3TC56	2

3TF2 contactors for switching motors, width 45 mm, size S00

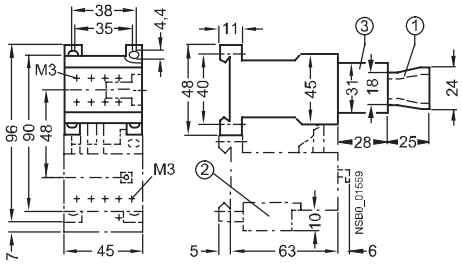
3TF20, 3TF28
With 1 auxiliary contact,
with screw terminals,
AC and DC operation,
without or with overload relay (3UA7)

① 3TX4 490 surge suppressor
② Additional module (on overload relay)

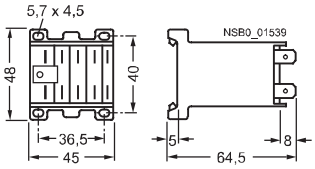


3TF20, 3TF22, 3TF28, 3TF29
With 2 to 5 auxiliary contacts,
with screw terminals,
AC and DC operation,
without or with overload relay

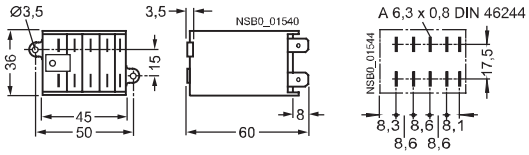
① 3TX4 490 surge suppressor
② Additional module (on overload relay)
③ Auxiliary switch block



3TF20
With flat connectors 6.3 mm x 0.8 mm,
for snap-on and screw fixing,
AC and DC operation

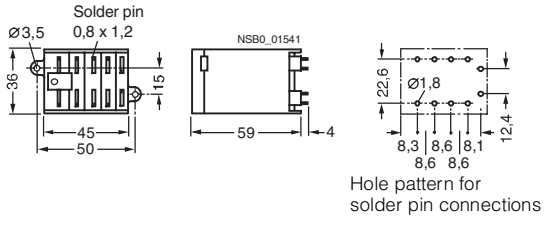


3TF20
With flat connectors 6.3 mm x 0.8 mm,
for screw fixing (diagonal),
AC and DC operation



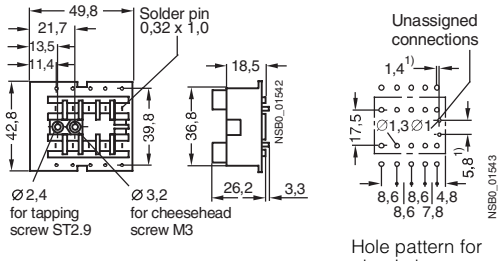
Grid size for flat connectors

3TF20
With solder pin connectors for printed circuit boards
for screw fixing (diagonal),
AC and DC operation



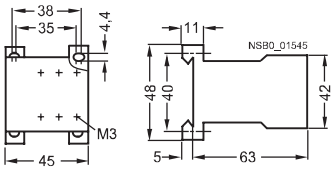
Hole pattern for solder pin connections

3TX4 491-2A plug-in base
With solder pin connectors for printed circuit boards



Hole pattern for plug-in base

3TX4 490 OFF-delay device

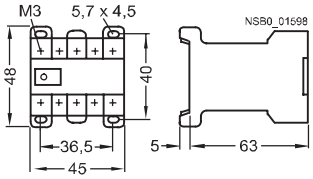


1) Holes required only for integrated surge suppression in the plug-in base.

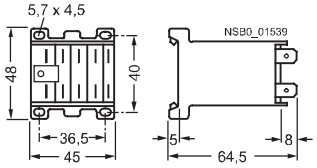
Project planning aids

3TK20 contactors, width 45 mm, size S00

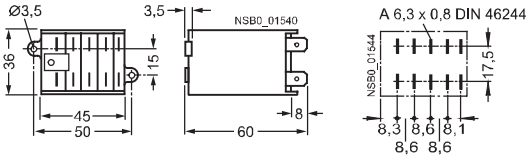
3TK20
With screw terminals,
for snap-on and screw fixing,
AC and DC operation



3TK20
With flat connectors 6.3 mm x 0.8 mm,
for snap-on and screw fixing,
AC and DC operation

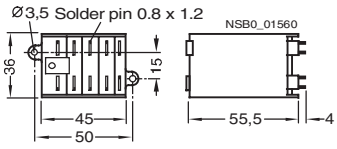


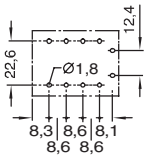
3TK20
With flat connectors 6.3 mm x 0.8 mm,
for screw fixing (diagonal),
AC and DC operation



Grid size
for flat connectors

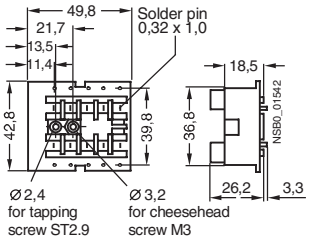
3TK20
With solder pin connectors for printed circuit boards,
for screw fixing (diagonal),
AC and DC operation

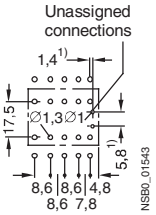




Hole pattern
for solder pin connections

3TX4 491-2A plug-in base
With solder pin connectors for printed circuit boards,





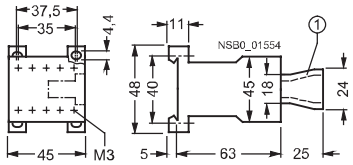
Hole pattern
for plug-in base

1) Holes required only for integrated surge suppression in the plug-in base.

3TH2 contactor relays, width 45 mm, size S00

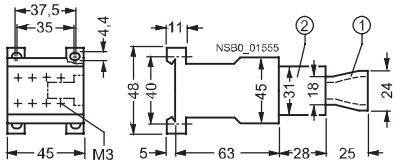
3TH20 with 4 contacts
With screw terminals,
AC and DC operation

① 3TX4 490 surge suppressor



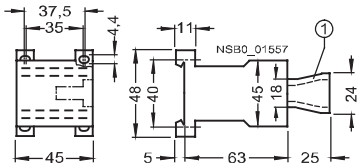
3TH20 with 6 and 8 contacts,
3TH22 with 8 contacts
With screw terminals,
AC and DC operation

① 3TX4 490 surge suppressor
② Auxiliary switch block



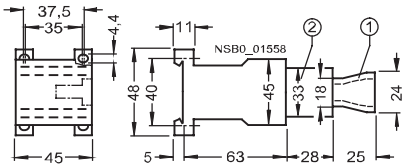
3TH20 with 4 contacts
AC and DC operation

① 3TX4 490 surge suppressor

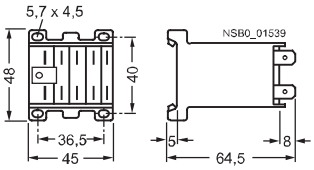


3TH20 with 6 and 8 contacts,
3TH22 with 8 contacts
AC and DC operation

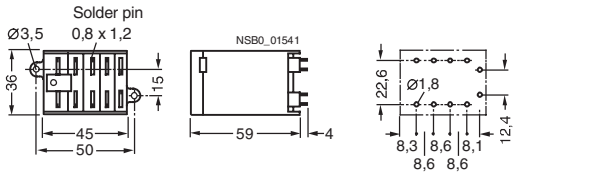
① 3TX4 490 surge suppressor
② Auxiliary switch block



3TH20
With flat connectors 6.3 mm x 0.8 mm,
for snap-on and screw fixing,
AC and DC operation

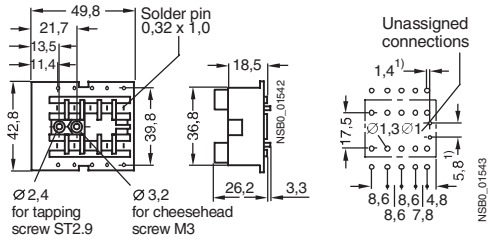


3TH20
With solder pin connectors for printed circuit boards
for screw fixing (diagonal),
AC and DC operation



Hole pattern
for solder pin connections

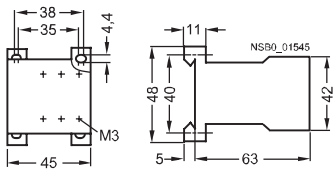
3TX4 491-2A plug-in base
With solder pin connectors for printed circuit boards



Hole pattern for
plug-in base

1) Holes required only for integrated surge suppression in the plug-in base.

3TX4 490 OFF-delay device

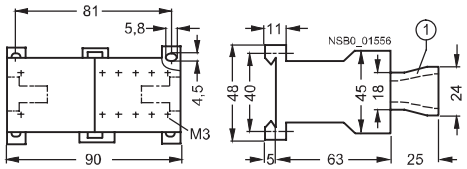


Project planning aids

3TH27 latched contactor relays, width 90 mm, size S00

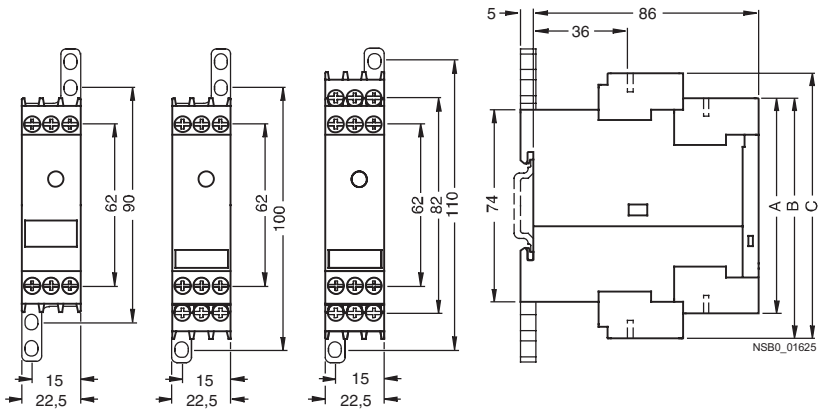
3TH27 with 4 contacts
With screw terminals,
for screw and snap-on mounting,
AC and DC operation

① Surge suppressor
3TX4 490



Coupling Relays in Industrial Enclosure

3RS18

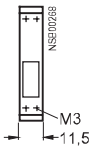


	A	B	C
	3RS18 00-.A	3RS18 00-.B	3RS18 00-.H
Removable terminal			
Spring-loaded terminal	84	94	103
Screw terminal	83	92	102

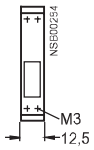
Coupling relays with narrow type of construction

3TX7 002, 3TX7 003 coupling links in modular terminal design

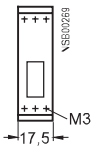
3TX7 00 .-1AB . .,
3TX7 00 .-2A . . .,
3TX7 002-3AB01



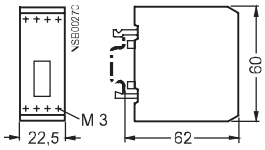
3TX7 002-3AB00,
3TX7 002-4A . . .



3TX7 00 .-1BB00,
3TX7 00 .-1BF00,
3TX7 002-2BF02



3TX7 00 .-1CB00,
3TX7 002-1FB02



3TX7 004, 3TX7 005 coupling links in two-tier design

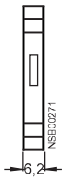
3TX7 00 .-1MB00,
3TX7 00 .-1MF00,
3TX7 00 .-1L . 0 .,
3TX7 00 .-2M . . .
relay coupling links

3TX7 00 .-1AB10,
3TX7 00 .-1BB00,
3TX7 00 .-1BB10,
3TX7 00 .-1CB00,
3TX7 00 .-1BF05
relay coupling links

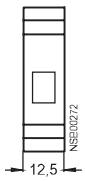
3TX7 00 .-1HB00
relay coupling links

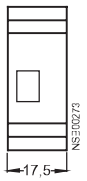
3TX7 00 .-1GB00
relay coupling links

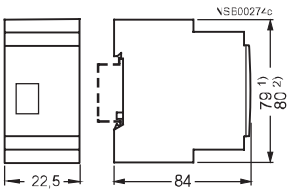
3TX7 00 .-3AB04,
3TX7 00 .-4AB04,
3TX7 00 .-3PB . .,
3TX7 00 .-3PG74,
3TX7 00 .-3RB43
semiconductor coupling links



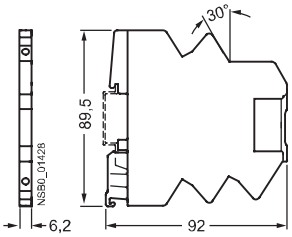
3TX7 00 .-3AC04,
3TX7 00 .-3AC14,
3TX7 00 .-3AC03
semiconductor coupling links



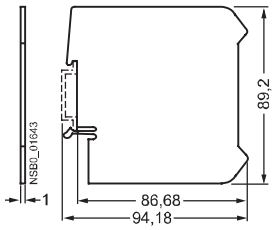




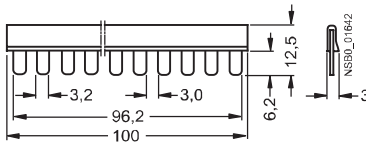
3TX7 014, 3TX7 015
relay couplers with plug-in design



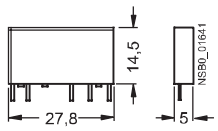
3TX7 014-7CE00
galvanic isolation plate



3TX7 014-7AA00
connecting comb, 16-pole



3TX7 014-7B.0.
individual relay module



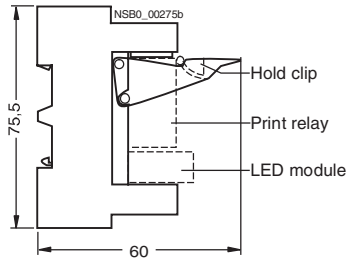
1) Dimensions for 3TX7 004 coupling links (screw terminals).

2) Dimensions for 3TX7 005 coupling links (spring-loaded terminals).

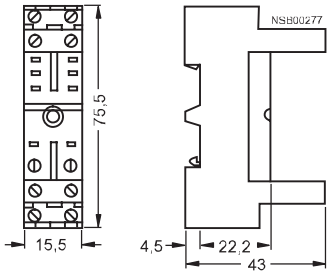
Project planning aids

LZX plug-in relays

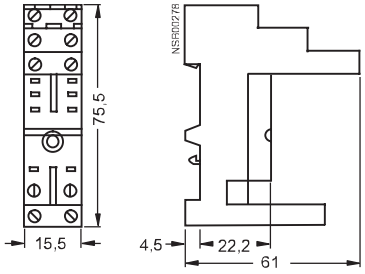
LZX:RT3/RT4 complete unit



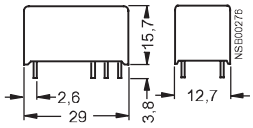
LZX:RT78625 plug-in base
For print relays



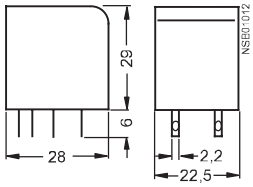
LZX:RT78626 plug-in base
With safe isolation for print relays



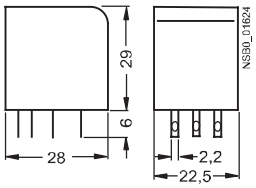
LZX:RT3/RT4 print relay



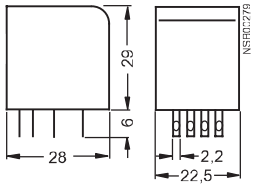
LZX:PT270 industrial relay



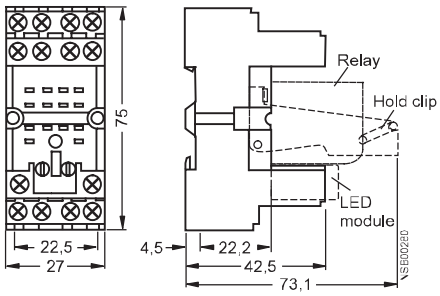
LZX:PT370 industrial relay



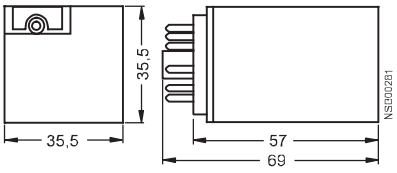
LZX:PT570 industrial relay



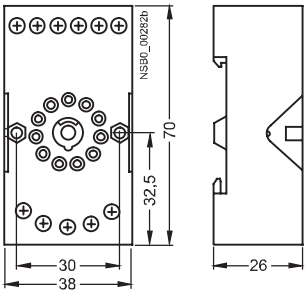
LZX:PT78704 plug-in base
For industrial relays
(side view: LZX:PT complete unit)



LZX:MT32 industrial relay



LZX:MT78750 plug-in base
For industrial relays



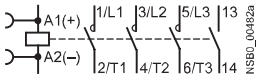
Schematics

Internal circuit diagrams for 3RT1 contactors and accessories (valid for screw and Cage Clamp terminals)

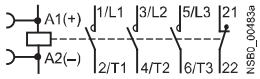
Size S00
Terminal designations according to EN 50012

3RT10 1 contactors

1 NO
Ident. No.: 10E

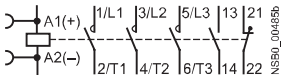


1 NC
01

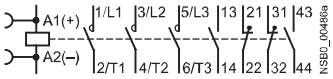


3RT10 1 contactors (with 1 NO)
with 3RH19 11-.H... auxiliary switch blocks on the front.

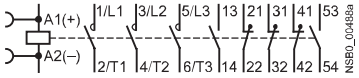
1 NO + 1 NC
Ident. No.: 11E



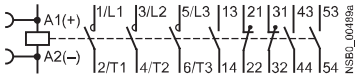
2 NO + 2 NC
22E



2 NO + 3 NC
Ident. No.: 23E

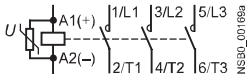


3 NO + 2 NC
32E



Size S0 to S3
Terminal designations according to EN 50012

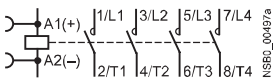
3RT10 . . - . X . 40-0LA2 contactors
Varistor built-in



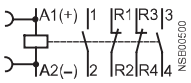
Contactors with 4 main contacts, size S00
Terminal designations according to EN 50005

3RT13 and 3RT15 contactors

4 NO



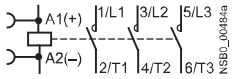
2 NO + 2 NC



(3RH19 11 auxiliary switch blocks according to EN 50005 can be snapped on)

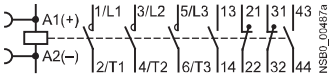
Size S0 to S12
Terminal designations according to EN 50012

3RT10 2 to 3RT10 7, 3RT12, 3RT14 contactors



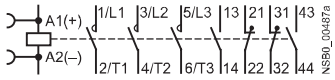
3RT10 2 to 3RT10 7, 3RT14 contactors
with front-mounted 4-pole 3RH19 21-.HA22 auxiliary switch block

2 NO + 2 NC
Ident. No.: 22E



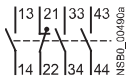
3RT1. 5, 3RT1. 6, 3RT1. 7 contactors (sizes S6, S10, S12)
with lateral 2-pole 3RH19 21-1DA11 auxiliary switch blocks

2 NO + 2 NC

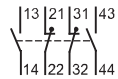


4-pole 3RH19 21-. HA../- .XA.. auxiliary switch blocks,
for snapping onto the front[1)]

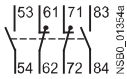
3 NO + 1 NC
Ident. No.: 31



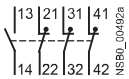
1 NO + 2 NC
22



2 NO + 2 NC
22



1 NO + 3 NC
13



First laterally mountable 3RH19 21-. DA11,
3RH19 21-2DE11 auxiliary switch block (solid-state compatible)

1 NO + 1 NC
left

1 NO + 1 NC
right

Second laterally mountable 3RH19 21-. JA11,
3RH19 21-2JE11 auxiliary switch block (solid-state compatible)
(only for sizes S3 to S12)

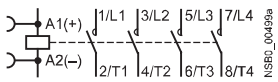
1 NO + 1 NC
left

1 NO + 1 NC
right

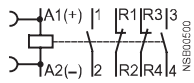
Contactors with 4 main contacts, sizes S0 to S3
Terminal designations according to EN 50005

3RT13 and 3RT15 contactors

4 NO



2 NO + 2 NC



(3RH19 21 auxiliary switch blocks according to EN 50005 can be snapped on)

Surge suppressors for sizes S00 to S3
(coded plug-in direction; Exception: for 3RT19 16-1T... diode assembly, designation with +/–)

Diode

Diode assembly

Varistor

RC elements

Diode with LED

Varistor with LED

1) Not for 3RT12 vacuum contactors.

Project planning aids

Internal circuit diagrams for 3RT1 contactors and accessories (valid for screw and Cage Clamp terminals)

Accessories for size S00 contactors and contactor relays
Terminal designations according to EN 50005

3RH19 11-. F... auxiliary switch blocks and 3RH19 11-.NF.. solid-state compatible auxiliary switch blocks, for snapping onto the front

2 NO
Ident. No.: 20

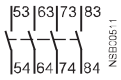
1 NO + 1 NC
11

2 NC
02

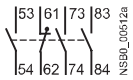
1 NO + 1 NC
11 U

With make-before-break

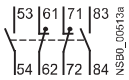
4 NO
Ident. No.: 40



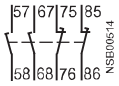
3 NO + 1 NC
31



2 NO + 2 NC
22

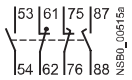


2 NO + 2 NC
22 U



With make-before-break

2 NO + 2 NC
11/11 U



1 NO + 1 NC standard
1 NO + 1 NC with make-before-break

Internal wiring

3RH19 11-1AA.. and 3RH19 11-1BA.. auxiliary switch blocks, for snapping onto the front, cable entry from above or below

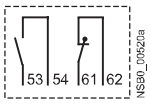
1 NO

1 NC

3RH19 11-1LA.. and 3RH19 11-1MA.. auxiliary switch blocks, for snapping onto the front, cable entry from above or below

2 NO

1 NO + 1 NC

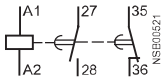


Example of 1 NO + 1 NC, cable entry from below

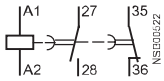
Accessories for size S00 contactors and contactor relays
Terminal designations according to DIN 46199 Part 5

3RT19 16-2E.../2F.../2G... solid-state, time-delay auxiliary switch blocks

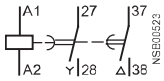
1 NO + 1 NC
ON-delay



1 NO + 1 NC
OFF-delay



2 NO
Wye-delta function

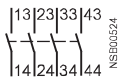


(Integrated varistors not shown)

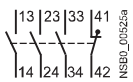
Accessories for size S0 to S12 contactors
Terminal designations according to EN 50005

3RH19 21-.F... auxiliary switch blocks, 4-pole, for snapping onto the front[1)]

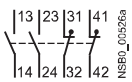
4 NO
Ident. No.: 40



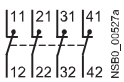
3 NO + 1 NC
31



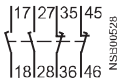
2 NO + 2 NC
22



4 NC
04



2 NO + 2 NC
22 U



With make-before-break

3RH19 21-. CA.. auxiliary switch blocks, 1-pole, for snapping onto the front[1)]

1 NO

1 NC

3RH19 21-1CD.. auxiliary switch blocks, 1-pole with make-before-break, for snapping onto the front[1)]

1 NO

1 NC

(terminal designations according to EN 50005 or EN 50012)

1) Not for 3RT12 vacuum contactors.

Internal circuit diagrams for 3RT1 contactors and accessories (valid for screw and Cage Clamp terminals)

Accessories for size S0 to S12 contactors
Terminal designations according to EN 50005

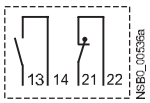
3RH19 21-1LA.. and 3RH19 21-1MA.. auxiliary switch block, 2-pole,
for snapping onto the front[1)]
cable entry from above or below

2 NO

1 NO + 1 NC

2 NC

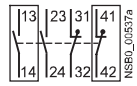
Internal wiring



Example of 1 NO + 1 NC,
cable entry
from below

3RH19 21- . FE22 solid-state compatible auxiliary switch block, 4-pole,
for snapping onto the front[1)]

2 NO + 2 NC
Ident. No.: 22



3RH19 21- . EA.. first laterally mountable auxiliary switch blocks (left)

2 NO

1 NO + 1 NC

2 NC

3RH19 21- . EA.. first laterally mountable auxiliary switch blocks (right)

2 NO

1 NO + 1 NC

2 NC

3RH19 21- . KA.. second laterally mountable auxiliary switch blocks (left)
(only for sizes S3 to S12)

2 NO

1 NO + 1 NC

2 NC

3RH19 21- . KA.. second laterally mountable auxiliary switch blocks (right)
(only for sizes S3 to S12)

2 NO

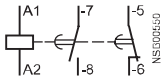
1 NO + 1 NC

2 NC

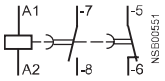
Accessories for size S0 to S12 contactors
Terminal designations according to DIN 46199 Part 5

3RT19 26-2E.../2F.../2G... solid-state, time-delay auxiliary switch blocks

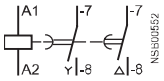
1 NO + 1 NC
ON-delay



1 NO + 1 NC
OFF-delay

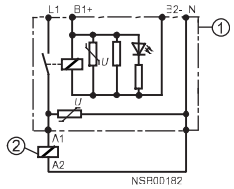


2 NO
Wye-delta function



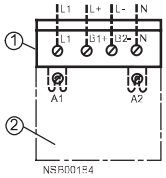
3RH19 24-1GP11 coupling relay with surge suppression

Terminal diagram



① Interface
② Contactor

Connection example



① Interface
② Contactor

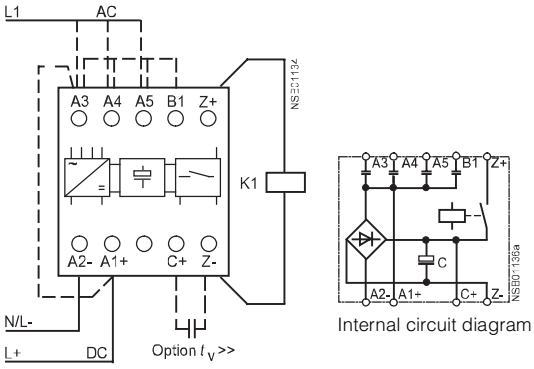
1) Not for 3RT12 vacuum contactors.

Project planning aids

Schematics for accessories for sizes S00 to S3

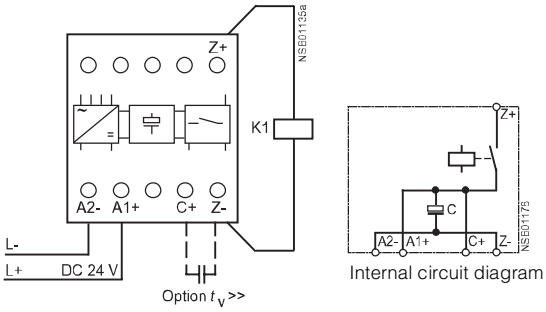
3RT19 16-2BK01, 110 V UC
3RT19 16-2BL01, 230 V UC

OFF-delay devices



3RT19 16-2BE01, 24 V DC

OFF-delay devices



3RT19 16-2BK01, 110 V UC

110 V UC	A1	A3	A4	A5	B1	A2	Z+	Z–	t_V (ms) >
S00 DC	L+					L–			130
50 Hz		L1				N	3RT1. 1.-.BF4. 3RH1. . .-.BF4.		130
60 Hz		L1				N			130
S0 DC	L+					L–			100
50 Hz		L1				N	3RT1. 2.-.BF4.		100
60 Hz		L1				N			100

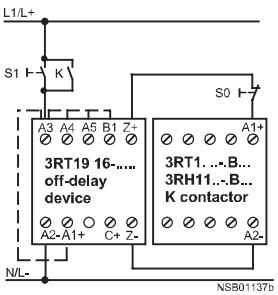
3RT19 16-2BE01, 24 V DC

24 V DC	A1	A2	Z+	Z–	t_V (ms) >
S00	L+	L–	3RT1. 1.-.BB4. 3RH1. . .-.BB4.		250
S0	L+	L–	3RT1. 2.-.BB4.		150
S2	L+	L–	3RT1. 3.-.BB4.		90
S3	L+	L–	3RT1. 4.-.BB4.		70

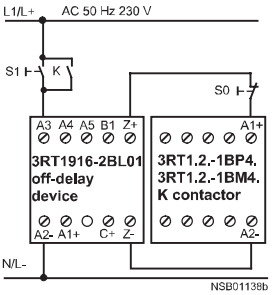
3RT19 16-2BL01, 230 V UC

230 V UC	A1	A3	A4	A5	B1	A2	Z+	Z–	t_V (ms) >
S00 DC	L+					L–			600
50 Hz			L1			N	3RT1. 1.-.BM4. 3RT1. 1.-.BP4. 3RH1. . .-.BM4.		600
60 Hz				L1		N	3RH1. . .-.BP4.		600
S0 DC	L+					L–			400
50 Hz		L1				N	3RT1. 2.-.BM4. 3RT1. 2.-.BP4.		400
60 Hz			L1			N			400

Operationafter OFF-delay
(contactor only switches off with delay in case of voltage failure)

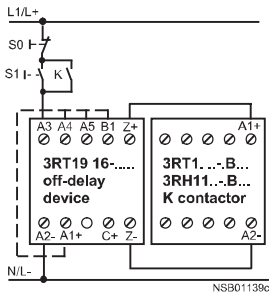


Schematic circuit diagram

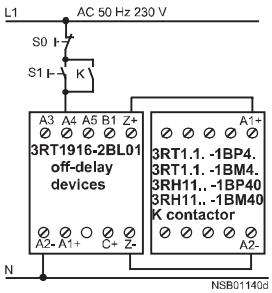


Typical circuit diagram:
Contactor size S0,
DC operation, at AC 50 Hz 230 V

Operation before OFF-delay
(contactor always switches off with delay)



Schematic circuit diagram



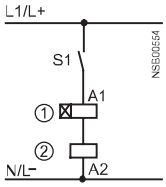
Typical circuit diagram:
Contactor size S00,
DC operation, at AC 50 Hz 230 V

Circuit diagrams for accessories for sizes S00 to S3

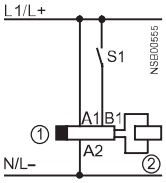
Accessories for size S00 to S3 contactors and contactor relays

Solid-state time-delay blocks
(note planning aids on Page 3/163!)

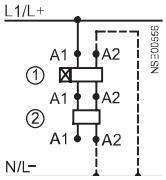
3RT19 16-2C...
ON-delay
Size S00



3RT19 16-2D...
OFF-delay (with auxiliary voltage)
Size S00

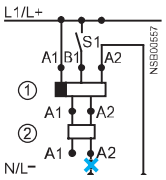


3RT19 26-2C...
ON-delay
Sizes S0 to S3



A2 can be connected to N(L–) using either the contactor or the timing relay.
- - - optionally connect

3RT19 26-2D...
OFF-delay (with auxiliary voltage)
Sizes S0 to S3

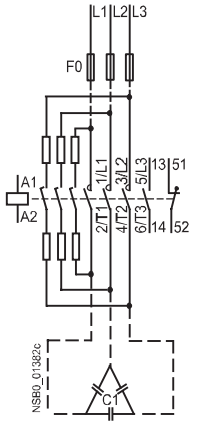


A2 must only be connected to N(L–) from the timing relay.
x do not connect

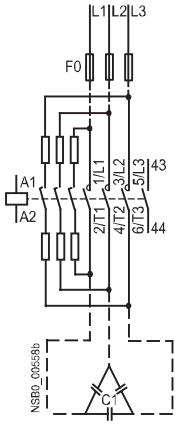
① Timing relay block
② Contactor

3RT16 capacitor contactors

Size S00



Sizes S0 and S3

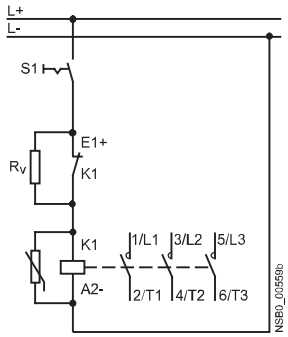


Internal circuit diagrams for accessories for sizes S00 to S3

Contactors with extended operating range 0.7 to 1.25 × U_s

Size S00
Terminal designations according to EN 50012

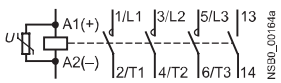
3RT10 17-2K.42-0LA0 contactors



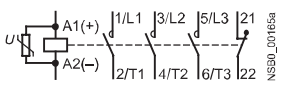
Series resistor R_V
Plugged on,
NC contact prewired.

3RT10 17-2K.41/2K.42 contactor
Varistor integrated
Size S00

1 NO
Ident. No.: 10E

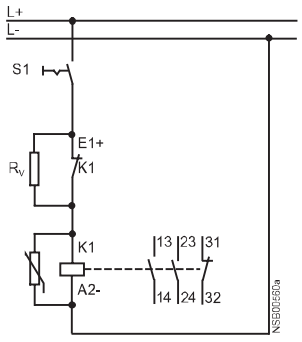


1 NC
01E



Terminal designations according to EN 50011

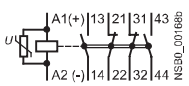
3RH11 22-2K.40-0LA0 contactor relays



2 NO + 1 NC unassigned
Series resistor R_V
Plugged on,
NC contact prewired.

3RH11 22-2K.40 contactor relay
Varistor integrated
Size S00

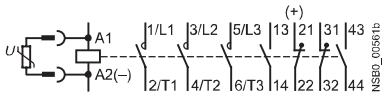
2 NO + 2 NC
22E



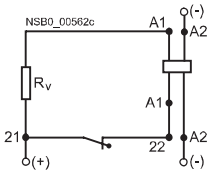
Size S00 to S3
Terminal designations according to EN 50012

3RT10 2.-, 3RT10 3.-,
3RT10 4.-3K.44-0LA0 contactors
With front-mounted 4-pole 3RH19 21-1HA22 auxiliary switch block

2 NO + 2 NC
Ident. No.: 22

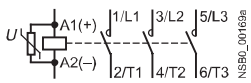


Circuit diagram of the series resistor wiring



The series resistor is supplied separately packed. The 21/22 NC contact is necessary to wire the series resistor.

3RT10 25-3K.40 contactor
Varistor integrated
Size S0



(two single-pole auxiliary switch blocks can be snapped on)

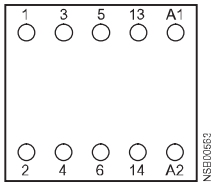
Project planning aids

Position of the terminals for 3RT1 contactors and accessories (valid for screw and Cage Clamp terminals)

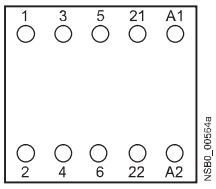
Size S00
Terminal designations according to EN 50012

3RT10 1 contactors, 3RT10 1 coupling relays
3RT10 17-2K.4. contactors with extended operating range

1 NO
Ident. No.: 10E

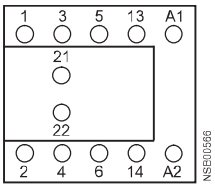


1 NC
01

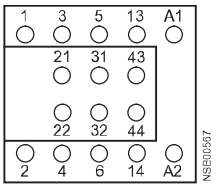


3RT10 1 contactors (with 1 NO contact)
with front-mounted 3RH19 11-. H . . .
auxiliary switch blocks

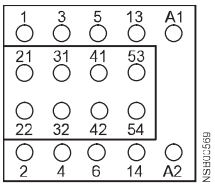
1 NO + 1 NC
Ident. No.: 11E



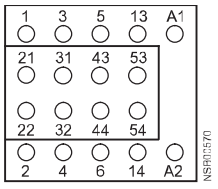
2 NO + 2 NC
22E



2 NO + 3 NC
Ident. No.: 23E

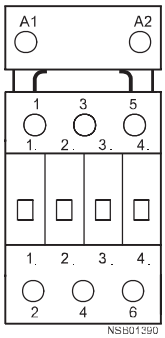


3 NO + 2 NC
32E



Size S0 to S3
Terminal designations according to EN 50012

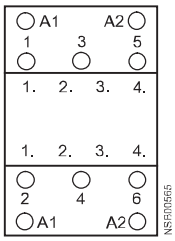
3RT10 . . - . X . 40-0LA2 contactors
with solid-state control unit



1) Note location identifier. Can only be used if no 4-pole auxiliary switch block is snapped onto the front.

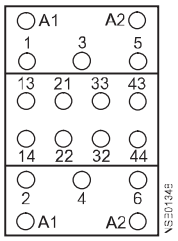
Size S0 to S12
Terminal designations according to EN 50012

3RT10 2, 3RT 10 3,
3RT10 4, 3RT14 46 contactors,
3RT10 2 coupling relays
3RT10 25-3K.40 contactors with
extended operating range



3RT10 2, 3RT10 3,
3RT10 4 contactors
with front-mountable
4-pole 3RH19 21-. HA31
auxiliary switch block

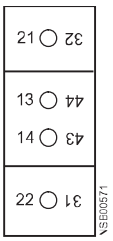
3 NO + 1 NC
Ident. No.: 31 E



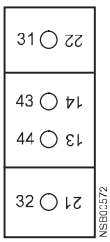
First laterally mountable
3RH19 21- . DA11[1)]
auxiliary switch block
can be mounted on the
left or right

1 NO + 1 NC

Left

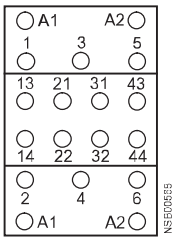


Right



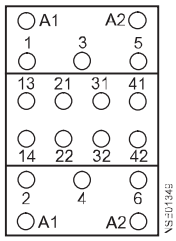
3RT10 2, 3RT10 3,
3RT10 4 contactors
with front-mounted
4-pole 3RH19 21-. HA22
auxiliary switch block

2 NO + 2 NC
Ident. No.: 22 E



3RT10 2, 3RT10 3,
3RT10 4 contactors
with front-mountable
4-pole 3RH19 21-. HA13
auxiliary switch block

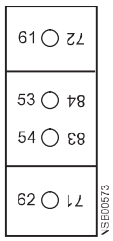
1 NO + 3 NC
13 E



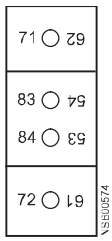
Second laterally mountable
3RH19 21- . JA11[1)]
auxiliary switch block
can be mounted on the left or
right (only for sizes S3 to S12)

1 NO + 1 NC

Left



Right



Position of the terminals for 3RT1 contactors and accessories (valid for screw and Cage Clamp terminals)

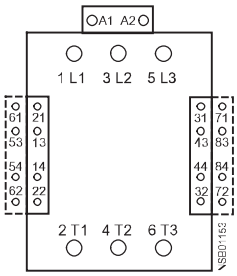
Sizes S6 to S12

3RT1 .5, 3RT1 .6, 3RT1 .7 contactors

- With conventional operating mechanism (3RT1. ..-.**A**...)

With laterally mountable
3RH19 21-1DA11
(for 2 NO + 2 NC, included in the contactors)
3RH19 21-1JA11
(can be extended to 4 NO + 4 NC)
auxiliary switch blocks

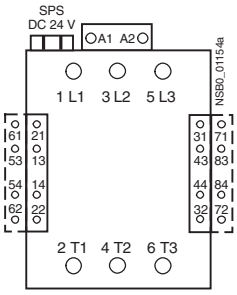
2 NO + 2 NC or 4 NO + 4 NC



- With solid-state operating mechanism (3RT1. ..-.**N**...)

With laterally mountable
3RH19 21-1DA11
(for 2 NO + 2 NC, included in the contactors)
3RH19 21-1JA11
(can be extended to 4 NO + 4 NC)
auxiliary switch blocks

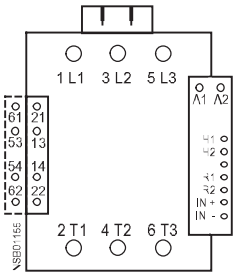
2 NO + 2 NC or 4 NO + 4 NC



- With solid-state operating mechanism (3RT1. ..-.**P**...)

With laterally mountable
3RH19 21-1DA11
(for 1 NO + 1 NC, included in the contactors)
3RH19 21-1JA11
(can be extended to 2 NO + 2 NC)
auxiliary switch blocks

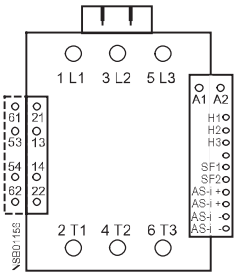
1 NO + 1 NC or 2 NO + 2 NC



- With solid-state operating mechanism (3RT1. ..-.**Q**...)

With laterally mountable
3RH19 21-1DA11
(for 1 NO + 1 NC, included in the contactors)
3RH19 21-1JA11
(can be extended to 2 NO + 2 NC)
auxiliary switch blocks

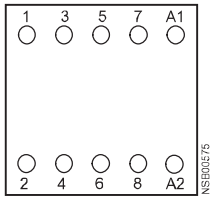
1 NO + 1 NC or 2 NO + 2 NC



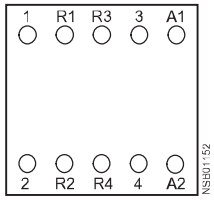
Contactors with 4 main contacts, size S00
Terminal designations according to EN 50005

3RT13 and 3RT15 contactors

4 NO



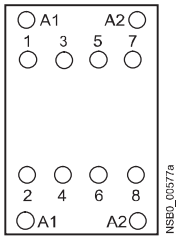
2 NO + 2 NC



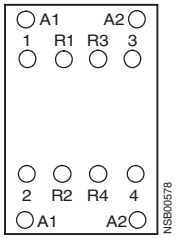
Contactors with 4 main contacts, sizes S0 to S3
Terminal designations according to EN 50005

3RT13 and 3RT15 contactors

4 NO



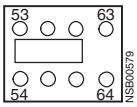
2 NO + 2 NC



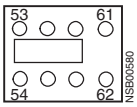
Accessories for size S00 contactors and contactor relays
Terminal designations according to EN 50005

3RH19 11-. F... auxiliary switch blocks and 3RH19 11-.NF.. solid-state compatible auxiliary switch blocks, for snapping onto the front

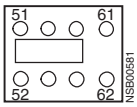
2 NO
Ident. No.: 20



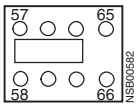
1 NO + 1 NC
11



2 NC
02

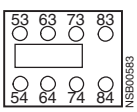


1 NO + 1 NC
11 U

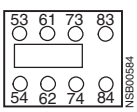


with make-before-break

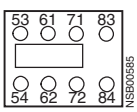
4 NO
Ident. No.: 40



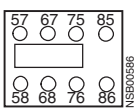
3 NO + 1 NC
31



2 NO + 2 NC
22

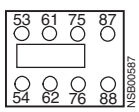


2 NO + 2 NC
22 U



with make-before-break

2 NO + 2 NC
11/11 U



1 NO + 1 NC ON-delay
1 NO + 1 NC with make-before-break

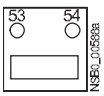
Project planning aids

Position of the terminals for 3RT1 contactors and accessories (valid for screw and Cage Clamp terminals)

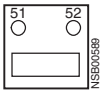
Accessories for size S00 contactors and contactor relays
Terminal designations according to EN 50005

3RH19 11-1AA..
auxiliary switch blocks for snapping onto the front
Cable entry from above

1 NO

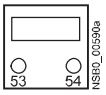


1 NC

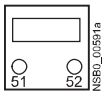


3RH19 11-1BA..
auxiliary switch blocks for snapping onto the front
Cable entry from below

1 NO

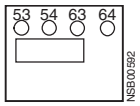


1 NC



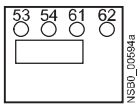
3RH19 11-1LA20

2 NO



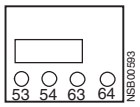
3RH19 11-1LA11

1 NO + 1 NC



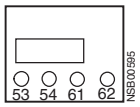
3RH19 11-1MA20

2 NO



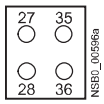
3RH19 11-1MA11

1 NO + 1 NC

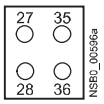


Terminal designations according to DIN 46199 Part 5
3RT19 16-2E.../2F.../2G... solid-state, time-delay auxiliary switch blocks

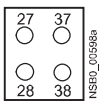
1 NO + 1 NC
ON-delay



1 NO + 1 NC
OFF-delay

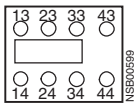


2 NO
Wye-delta function

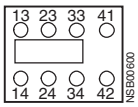


Accessories for size S0 to S12 contactors
Terminal designations according to EN 50005
3RH19 21-. F... auxiliary switch blocks, 4-pole,
for snapping onto the front

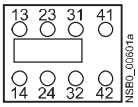
4 NO
Ident. No.: 40



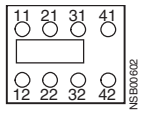
3 NO + 1 NC
31



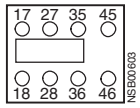
2 NO + 2 NC
22



4 NC
04



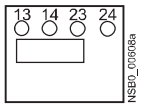
2 NO + 2 NC
22 U



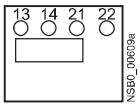
with make-before-break

3RH19 21-1LA.. auxiliary switch blocks, 2-pole,
for snapping onto the front, cable entry from the top

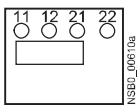
2 NO



1 NO + 1 NC

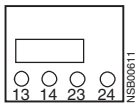


2 NC

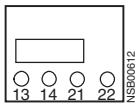


3RH19 21-1MA.. auxiliary switch blocks, 2-pole,
for snapping onto the front, cable entry from the bottom

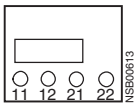
2 NO



1 NO + 1 NC

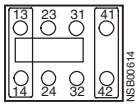


2 NC



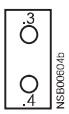
Solid-state compatible 3RH19 21- . FE22 auxiliary switch block, 4-pole,
for snapping onto the front

2 NO + 2 NC
Ident. No.: 22

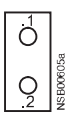


Terminal designations according to EN 50005 or EN 50012
3RH19 21-. CA.. auxiliary switch blocks, 1-pole,
for snapping onto the front

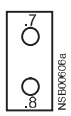
1 NO



1 NC

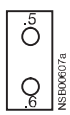


1 NO



with extended
contacting

1 NC



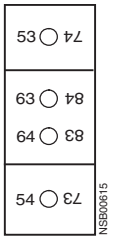
with extended
contacting

Position of the terminals for 3RT1 contactors and accessories

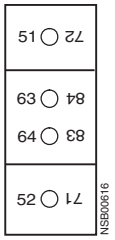
Accessories for size S0 to S12 contactors
Terminal designations according to EN 50005

First laterally mountable 3RH19 21-.EA.. auxiliary switch blocks (left)

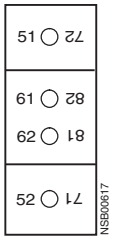
2 NO



1 NO + 1 NC

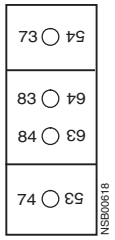


2 NC

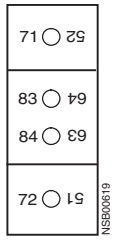


First laterally mountable 3RH19 21-.EA.. auxiliary switch blocks (right)

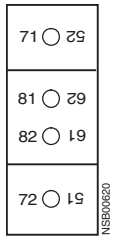
2 NO



1 NO + 1 NC

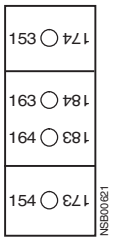


2 NC

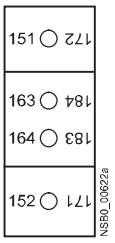


Second laterally mountable 3RH19 21-.KA.. auxiliary switch blocks (left)
(only for sizes S3 to S12; can only be used if no auxiliary contacts are snapped onto to the front)

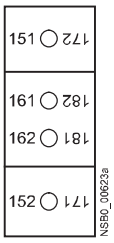
2 NO



1 NO + 1 NC

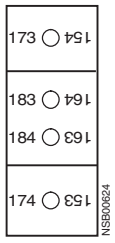


2 NC

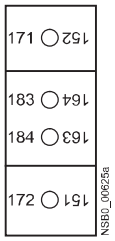


Second laterally mountable 3RH19 21-.KA.. auxiliary switch blocks (right)
(only for sizes S3 to S12; can only be used if no auxiliary contacts are snapped onto to the front)

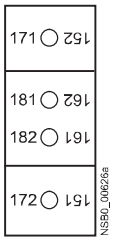
2 NO



1 NO + 1 NC



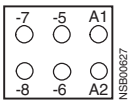
2 NC



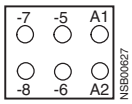
Accessories for size S0 to S12 contactors
Terminal designations according to DIN 46199 Part 5

3RT19 26-2E.../2F.../2G... solid-state, time-delay auxiliary switch blocks

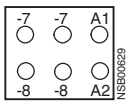
1 NO + 1 NC
ON-delay



1 NO + 1 NC
OFF-delay

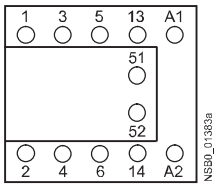


2 NO
Wye-delta function



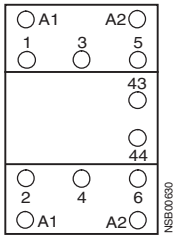
3RT16 capacitor contactors

Size S00
With 4-pole auxiliary switch block mounted on the front



The auxiliary switch block contains 3 leading contacts (not shown), and one unassigned NO contact and one unassigned NC contact.

Size S0 and S3
With 4-pole auxiliary switch block mounted on the front



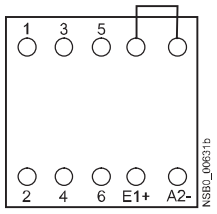
The auxiliary switch block contains 3 leading contacts (not shown) and one unassigned NO contact.

Project planning aids

Position of the terminals for 3RT1 contactors and accessories

Contactors with extended operating range 0.7 to 1.25 × U_S
Size S00
Terminal designations according to EN 50012

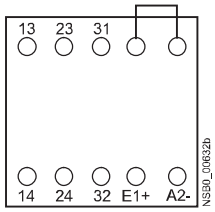
3RT10 17-2K.42-0LA0 contactors



Series resistor R_V plugged on, NC contact prewired.
3RH19 11-2.... auxiliary switch blocks according to EN 50005 can be mounted

Terminal designations according to EN 50011

3RH11 22-2K.40-0LA0 contactor relays

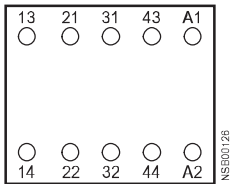


Series resistor R_V plugged on, NC contact prewired.
3RH19 11-2.... auxiliary switch blocks according to EN 50005 can be snapped on

Contactor relays with extended operating range 0.7 to 1.25 × U_S
Size S00

3RH11 22-2K.40 contactor relays

2 NO + 2 NC
Ident. No.: 22 E

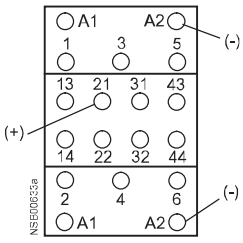


It is not possible to mount an auxiliary switch block.

Contactors with extended operating range 0.7 to 1.25 × U_S
Size S0 to S3
Terminal designations according to EN 50012

3RT10 2.-, 3RT10 3.-, 3RT10 4.-3K.44-0LA0 contactors
with front 4-pole 3RH19 21-2HA22 auxiliary switch block

2 NO + 2 NC
Ident. No.: 22 E



For circuit diagram of the series resistor wiring, see page 3/217.

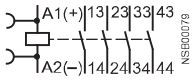
Note:
For position of terminals for the 3RT10 17-2K.4. and 3RT10 25-3K.40 contactors see page 3/218.

Connection diagrams for 3RH1 contactor relays, size S00

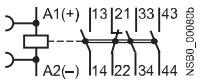
Terminal designations according to EN 50011[1)]

3RH11 contactor relays

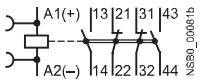
4 NO
Ident. No.: 40E



3 NO + 1 NC
31 E

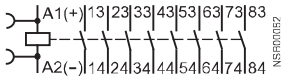


2 NO + 2 NC
22E

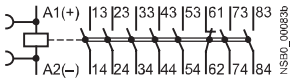


3RH11 40 contactor relays
With 3RH19 11-1GA..,
3RH12 44, 3RH12 62 auxiliary switch blocks snapped onto the front

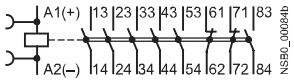
8 NO
Ident. No.: 80E



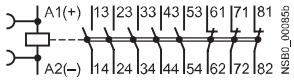
7 NO + 1 NC
71E



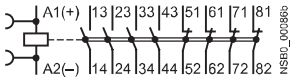
6 NO + 2 NC
62E



5 NO + 3 NC
Ident. No.: 53E

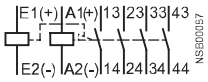


4 NO + 4 NC
44E

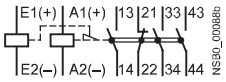


3RH14 latched contactor relays

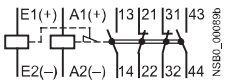
4 NO
Ident. No.: 40E



3 NO + 1 NC
1E



2 NO + 2 NC
22E



Surge suppressor (plug-in direction coded)

Diode

Diode assembly

Varistor

RC elements

Diode with LED

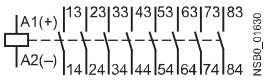
Varistor with LED

1) Positively driven operation is assured likewise for auxiliary switch blocks according to EN 50005 in conjunction with 3RH11 contator relays (basic units).

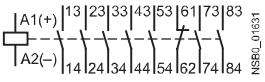
Connection diagrams for 3TH42 contactor relays with 8 contacts

Terminal designations according to EN 50011

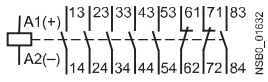
8 NO
Ident. No.: 80E



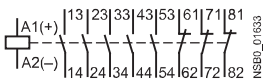
7 NO + 1 NC
71E



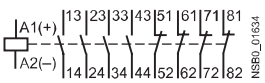
6 NO + 2 NC
62E



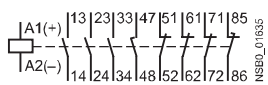
5 NO + 3 NC
Ident. No.: 53E



4 NO + 4 NC
44E



3 NO + 3 NC and 1 NO + 1 NC make-before-break
44E, U

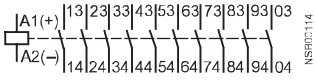


Project planning aids

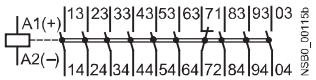
Connection diagrams for 3TH43 contactor relays with 10 contacts

Terminal designations according to EN 50011

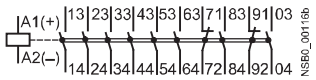
10 NO
Ident. No.: 100E



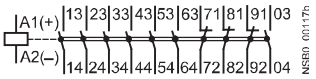
9 NO + 1 NC
91E



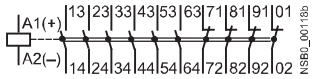
8 NO + 2 NC
82E



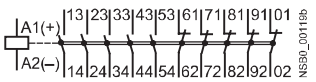
7 NO + 3 NC
Ident. No.: 73E



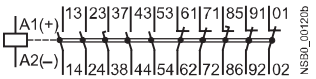
6 NO +4 NC
64E



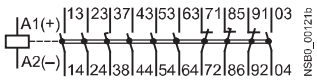
5 NO + 5 NC
55E



4 NO + 4 NC, 1 NO + 1 NC make-before-break
Ident. No.: 55E; U



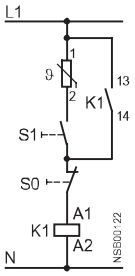
6 NO + 2 NC, 1 NO + 1 NC make-before-break
73E; U



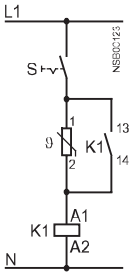
Circuit diagrams for 3TH43 contactor relays with 10 contacts

3TX4 180-0A NTC thermistor module
Switching examples

Momentary-contact operation

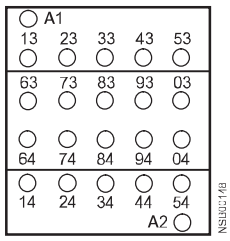


Maintained-contact operation

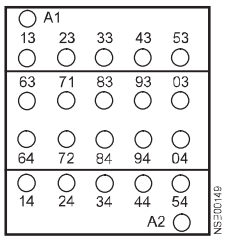


Position of the terminals for 3TH43 contactor relays with 10 contacts

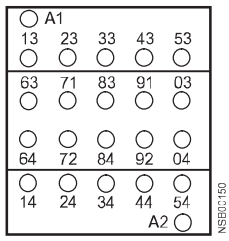
10 NO
Ident. No.: 100E



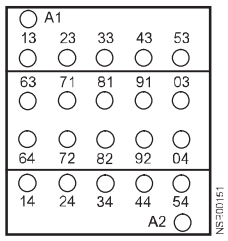
9 NO + 1 NC
91E



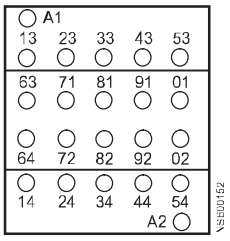
8 NO + 2 NC
82E



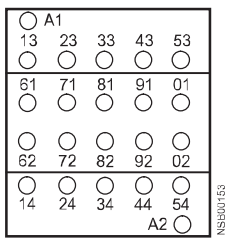
7 NO + 3 NC
73E



6 NO + 4 NC
Ident. No.: 64E



5 NO + 5 NC
55E

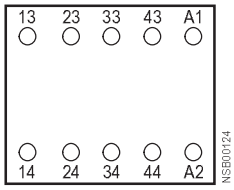


Position of the terminals for 3RH1 contactor relays, size S00

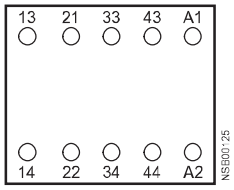
Terminal designations according to EN 50011

3RH11 contactor relays

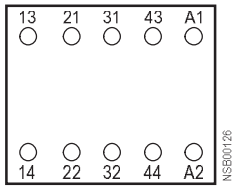
4 NO
Ident. No.: 40E



3 NO + 1 NC
31E

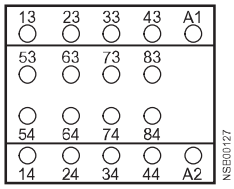


2 NO + 2 NC
22E

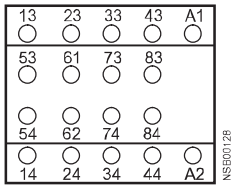


3RH11 40 contactor relays
With 3RH19 11-1GA..,
3RH12 44, 3RH12 62 auxiliary switch blocks snapped onto the front

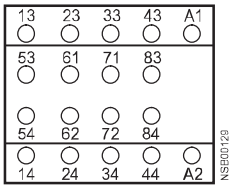
8 NO
Ident. No.: 80E



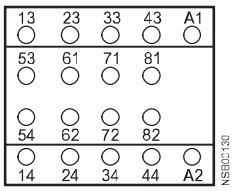
7 NO + 1 NC
71E



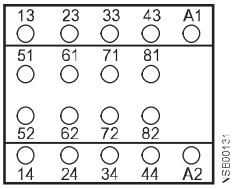
6 NO + 2 NC
62E



5 NO + 3 NC
53E

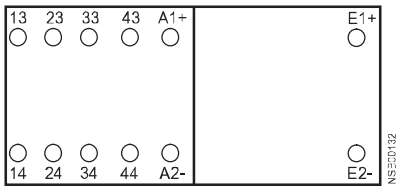


4 NO + 4 NC
Ident. No.: 44E

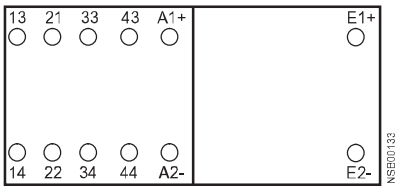


3RH14 latched contactor relays

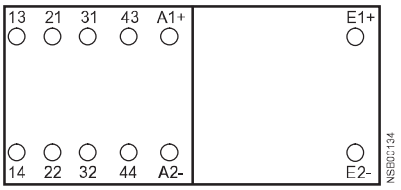
4 NO
Ident. No.: 40E



3 NO + 1 NC
31E



2 NO + 2 NC
Ident. No.: 22E



Project planning aids

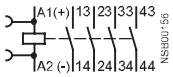
Connection diagrams for 3RH11 coupling relays for switching auxiliary circuits

DC operation
• L+ is to be connected to coil terminal A1.

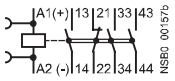
3RH11 coupling relays for auxiliary circuits
Size S00
Terminal designations according to EN 50011
(it is not possible to snap on an auxiliary switch block)

Surge suppressor can be mounted

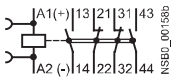
4 NO
Ident. No.: 40E



3 NO + 1 NC
31E

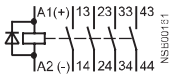


2 NO + 2 NC
22E

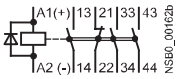


Diode integrated

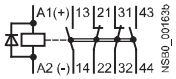
4 NO
Ident. No.: 40E



3 NO + 1 NC
31E

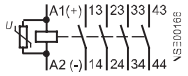


2 NO + 2 NC
22E

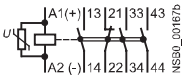


Varistor integrated

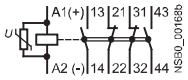
4 NO
Ident. No.: 40E



3 NO + 1 NC
31E



2 NO + 2 NC
22E

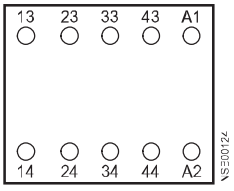


Surge suppressors for size S00 coupling relays
see 3RH11 contactor relays, page 3/223.

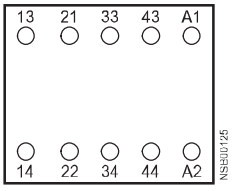
Position of the terminals for 3RH11 coupling relays for switching auxiliary circuits

Size S00
3RH11 coupling relays

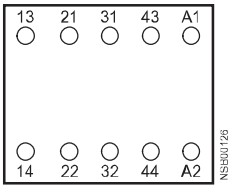
4 NO
Ident. No.: 40E



3 NO + 1 NC
31E



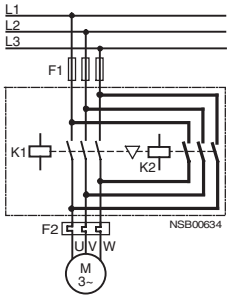
2 NO + 2 NC
22E



Circuit diagrams for 3RA13 reversing contactor assemblies

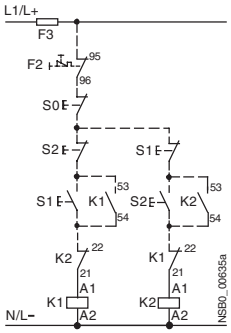
Size S00

Main circuit

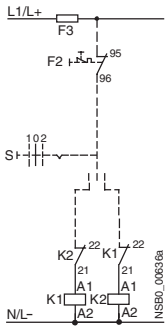


Control circuit
(the terminal designations for the contactors comply with EN 50012)

For momentary-contact operation



For maintained-contact operation

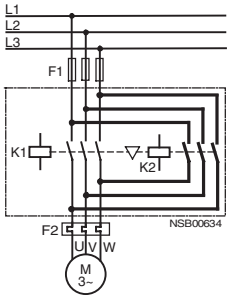


The 3RA19 13-2A installation kit contains, among other things, wiring connectors for connecting the main conducting paths.

The 3RA19 13-2A installation kit contains, among other things, the electrical interlock.

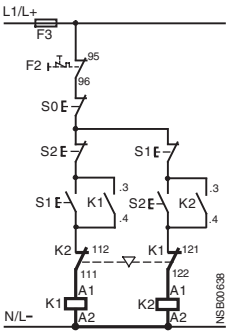
Sizes S0 to S3

Main circuit

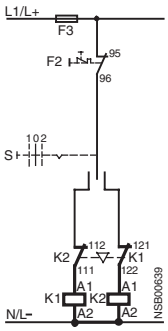


Control circuit
(the terminal designations for the contactors comply with EN 50005)

For momentary-contact operation



For maintained-contact operation



The 3RA19 .3-2A installation kits contain, among other things, the wiring connectors on the top and bottom for connecting the main conducting paths.

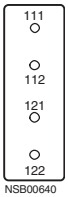
The 3RA19 24-2B mechanical interlock contains one NC contact for each contactor for the NC contact interlock.

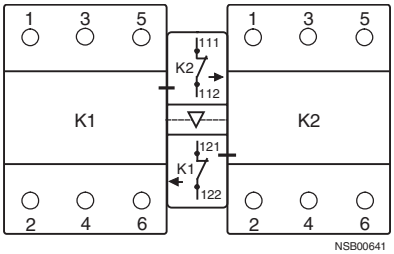
Position of the terminals for 3RA13 reversing contactor assemblies

Size S0 to S3
Terminal designations according to EN 50005

3RA19 24-2B mechanical interlock
(laterally mountable), integrated in reversing contactor assemblies (reversing starters), contains one NC contact for the electrical interlock for each contactor

2 NC





S0 Button "OFF"
S1 Button "Clockwise ON"
S2 Button "Counterclockwise ON"
S Button "CW-OFF-CCW"

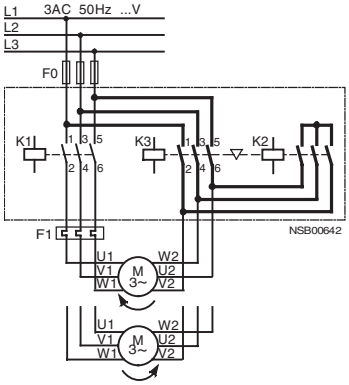
K1 Clockwise contactor
K2 Counterclockwise contactor

F1 Fuses for main circuit
F3 Fuses for control circuit
F2 Overload relays

Project planning aids

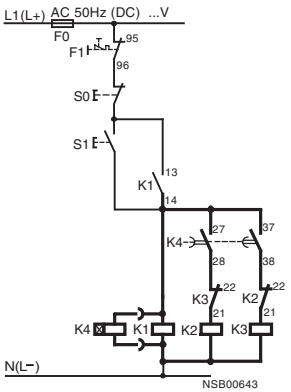
Circuit diagrams for 3RA14 wye-delta starting contactor assemblies

Size S00
Main circuit

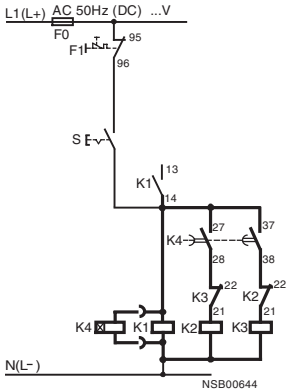


Control circuits
With 3RT19 16-2G... solid state time-delay auxiliary switch block,
snapped onto the front (example circuits)

For momentary-contact operation

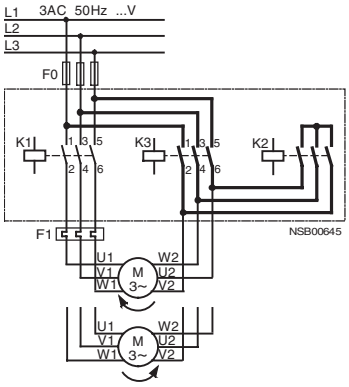


For maintained-contact operation



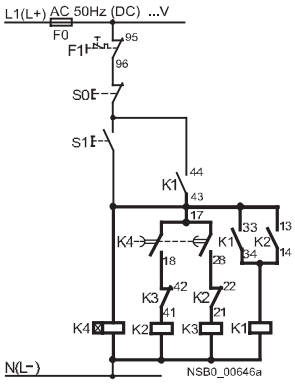
The 27/28 contact element for the solid-state time-delay auxiliary switch block with wye-delta function is only closed on the delta level; the contact element is open in the delta stage as well as in the de-energized state.

Sizes S0 to S3 (S6 to S12, depending on power)
Main circuit

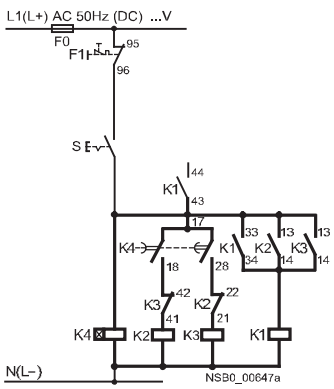


Control circuits
With 3RP15 7. timing relay,
laterally mounted (example circuits)

For momentary-contact operation

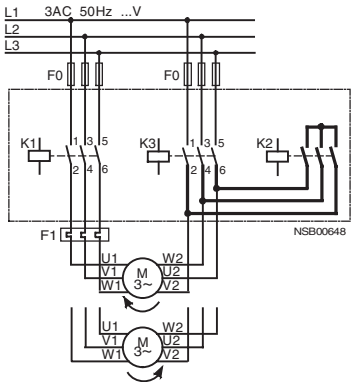


For maintained-contact operation



The contact element 17/18 is only closed in the star stage;
the contact element is open in the delta stage as well as in the de-energized state.
S1 (S) is connected to terminal K1/33.

Sizes S2 to S3 (S6 to S12, depending on power)



S0 Button "OFF"
S1 Button "ON"
S Maintained-contact switch

K1 Line contactor
K2 Wye contactor
K3 Delta contactor
K4 Solid-state, time-delay auxiliary switch block or timing relay

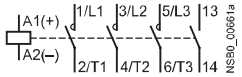
F0 Fuses
F1 Overload relays

Internal circuit diagrams for 3TG10 miniature contactors

3TG10 10 contactors

1 NO

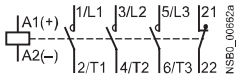
Ident. No.: 10E



3TG10 01 contactors

1 NC

01E



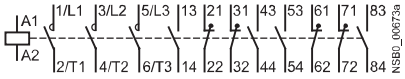
Internal circuit diagrams for 3TF68 and 3TF69 vacuum contactors, 3-pole

3TF68 44 and 3TF69 44 contators

4 NO + 4 NC

AC operation

Maximum number of auxiliary contacts that can be fitted

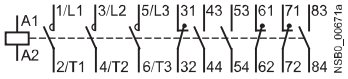


3TF68 33 and 3TF69 33 contactors

3 NO + 3 NC

DC operation

Maximum number of auxiliary contacts that can be fitted



3TY7 681-1G
auxiliary switch blocks

For coil reconnection, 3TF68 and 3TF69, DC economy circuit

3TY7 561-1AA00
auxiliary switch blocks

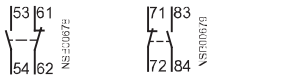
1st auxiliary switch block left or right

Mounted on left Mounted on right

3TY7 561-1KA00
auxiliary switch blocks

2nd auxiliary switch block left or right

Mounted on left Mounted on right



3TY7 561-1EA00
auxiliary switch blocks

with overlapping contacting

Mounted on left Mounted on right

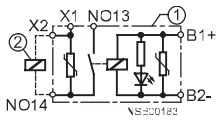
3TY7 561-1.
auxiliary switch blocks

Solid-state compatible auxiliary switch block

Mounted on left Mounted on right

3TX7 090-0D
interface for control by PLC

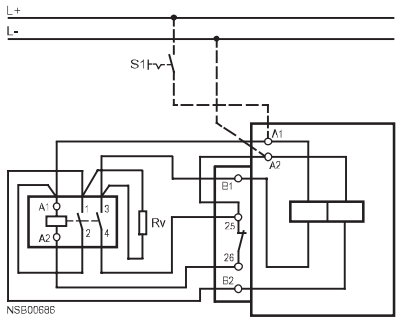
With surge suppression



① Interface
② Contactor

Circuit diagrams for DC economy circuit · Maintained-contact operation, 3TF68 and 3TF69 vacuum contactors, 3-pole

3TF68 33-.D and 3TF69 33-.D contactors

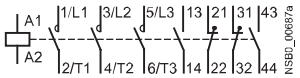


Project planning aids

Internal circuit diagrams for 3TB50 to 3TB56 contactors, 3-pole

Sizes 6 to 12
3TB50 to 3TB56

DC operation
Auxiliary contacts: **2 NO + 2 NC**



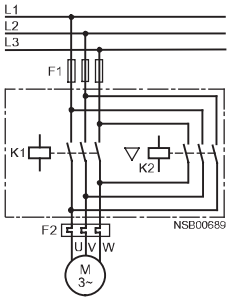
3TY6 501-1E, 3TY6 561-1E
auxiliary switch block

With overlapping
contacting

Circuit diagrams for 3TD68 reversing contactor assemblies

Main circuit

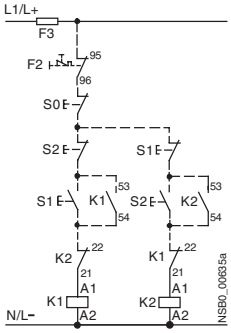
In the main circuit the connections are made between contactors K1 and K2.



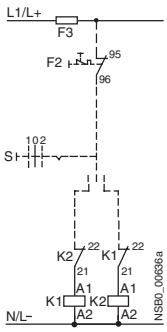
Control circuits

The control circuit leads indicated by broken lines are not wired in the factory.

Momentary-contact operation



Maintained-contact operation



Terminal designations of the unassigned auxiliary contacts

Contactor assembly	With electrical interlock				Without electrical interlock			
	Contactor K1		Contactor K2		Contactor K1		Contactor K2	
	NO contact	NC contact	NO contact	NC contact	NO contact	NC contact	NO contact	NC contact
3TD68	13 – 14 43 – 44 53 – 54 83 – 84	21 – 22 61 – 62 71 – 72	13 – 14 43 – 44 53 – 54 83 – 84	31 – 32 61 – 62 71 – 72	13 – 14 43 – 44 53 – 54 83 – 84	21 – 22 31 – 32 61 – 62 71 – 72	13 – 14 43 – 44 53 – 54 83 – 84	21 – 22 31 – 32 61 – 62 71 – 72

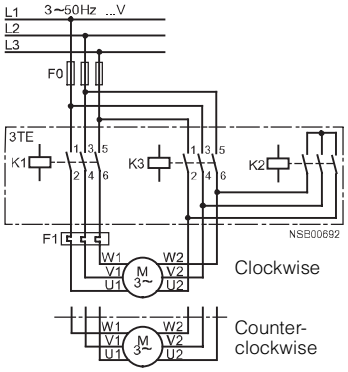
S0 Button "OFF"
S1 Button "Clockwise ON"
S2 Button "Counterclockwise ON"
S Button "CW-OFF-CCW"
K1 Clockwise contactor
K2 Counterclockwise contactor
F1 Fuses for main circuit
F3 Fuses for control circuit
F2 Overload relay

Circuit diagrams for 3TE68 wye-delta starting contactor assemblies

Main circuit

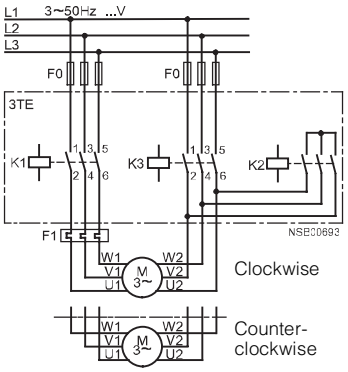
Single infeed

Without main conducting path connection between line and delta contactors



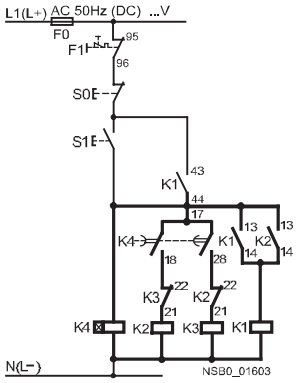
Double infeed

Without main conducting path connection between line and delta contactors

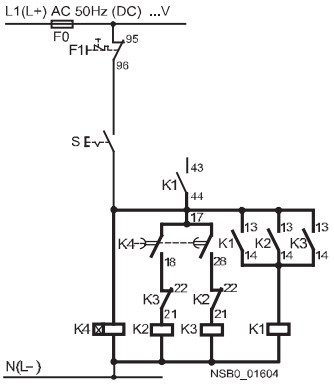


Control circuit with 3RP1 574 timing relay

For momentary-contact operation



For maintained-contact operation



The contact element 17/18 is only closed in the wye stage; the contact element is open in the delta stage as well as in the de-energized state.

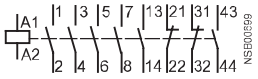
S0 Button "OFF"
S1 Button "ON"
S Maintained-contact switch

K1 Line contactor
K2 Wye contactor
K3 Delta contactor
K4 Timing relay

F0 Fuses
F1 Overload relay

Internal circuit diagrams for 3TK1 contactors, 4-pole (4 NO) for switching resistive loads (AC-1)

3TK1 contactors



3TK19 10-3B auxiliary switch block

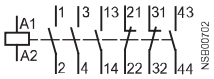
Mounted on left

Mounted on right

Project planning aids

3

Internal circuit diagram for 3TC44 to 3TC56 contactors for switching DC voltage

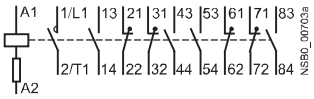


Internal circuit diagrams for 3TC74, 3TC78 contactors for switching DC voltage

DC operation

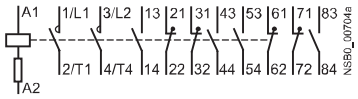
3TC74 contactors

Auxiliary contacts **4 NO + 4 NC**



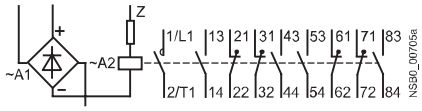
3TC78 contactors

Auxiliary contacts **4 NO + 4 NC**

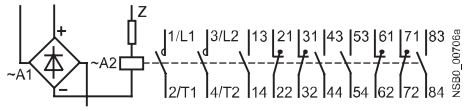


AC operation

Auxiliary contacts **4 NO + 4 NC**
Must be operated in the DC circuit

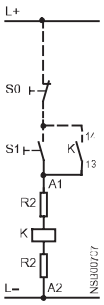


Auxiliary contacts **4 NO + 4 NC**
Must be operated in the DC circuit

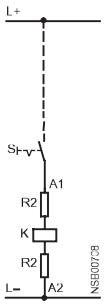


Circuit diagrams for 3TC74, 3TC78 contactors for switching DC voltage

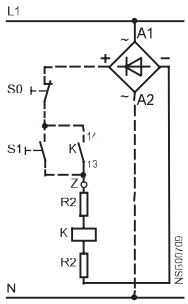
3TC74 contactors
Momentary-contact operation
DC operation



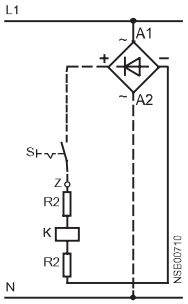
Maintained-contact operation



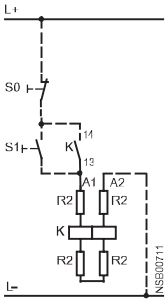
Momentary-contact control
AC operation (must be operated in the DC circuit)



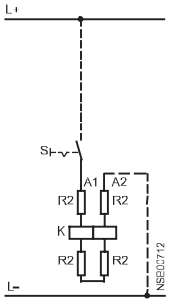
Maintained-contact control



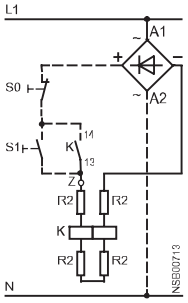
3TC78 contactors
Momentary-contact operation
DC operation



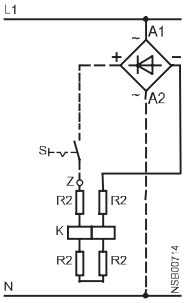
Maintained-contact operation



Momentary-contact control
AC operation (must be operated in the DC circuit)

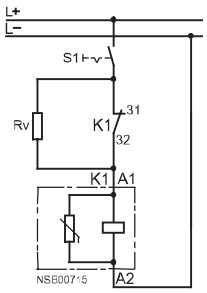


Maintained-contact control

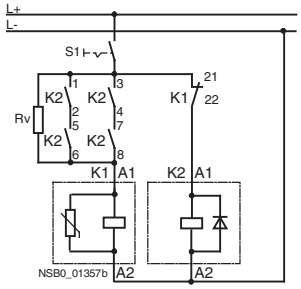


Circuit diagrams for 3T contactors with extended operating range 0.7 to 1.25 x U_s

Circuit with series resistor R_v (size 2 or larger)
without reversing contactor



Circuit with series resistor R_v and
reversing contactor K2
(for K1 contactors size 8 or larger)



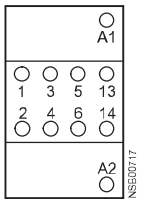
R_v:
Two resistors are connected in series for 3TB54, 3TB56 and 3TC56 contactors.

K2:
For 3TB52 to 3TB56 and 3TC52 to 3TC56:
3RT13 17-1F . 40

Position of the terminals for 3TG10 miniature contactors

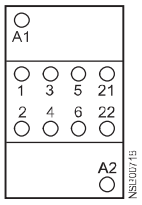
3TG10 10 contactors

1 NO



3TG10 01 contactors

1 NC

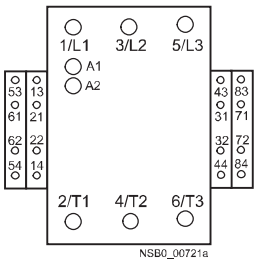


Position of the terminals for 3TF68 and 3TF69 vacuum contactors, 3-pole

AC operation

3TF68 and 3TF69 contactors

4 NO + 4 NC

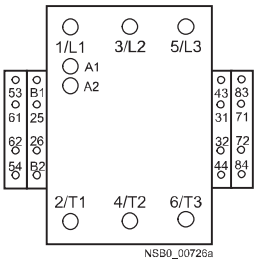


DC operation

3TF68 and 3TF69 contactors

3 NO + 3 NC

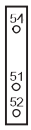
Max. number of auxiliary contacts that can be fitted



Solid-state compatible auxiliary switch blocks

3TY7 561-1 . for lateral mounting

Left mounted



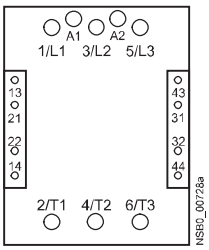
Right mounted

Project planning aids

Position of the terminals for 3TB50 to 3TB56 contactors, 3-pole

Size 6 to 12
3TB50 to 3TB56 contactors

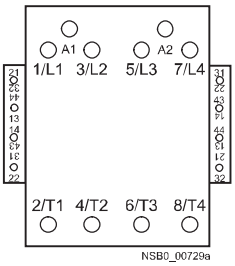
2 NO + 2 NC



Position of the terminals for 3TK1 contactors for switching resistive loads (AC-1)

3TK10 to 3TK17 contactors

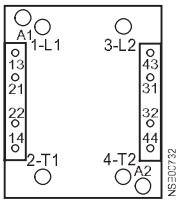
2 NO + 2 NC



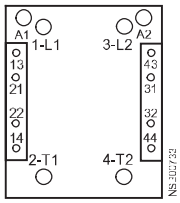
Position of the terminals for 3TC contactors for switching DC voltage

AC and DC operation

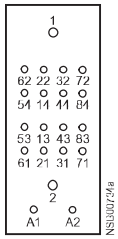
Size 2
3TC44 contactors



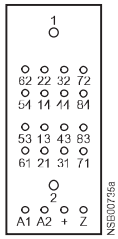
Sizes 4, 8 and 12
3TC48 to 3TC56 contactors



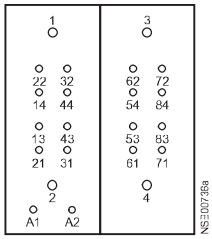
DC operation
3TC74 contactors



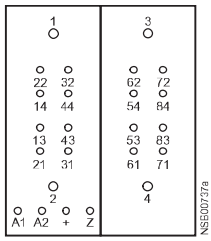
AC operation
3TC74 contactors



DC operation
3TC78 contactors



AC operation
3TC78 contactors

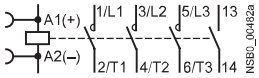


Internal circuit diagrams for 3TF2 and 3TK2 contactors

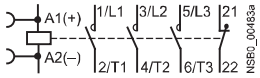
Size S00
Terminal designations according to EN 50012

3TF20 ..-0 and 3TF28 ..-0 contactors
with AC and DC operation

1 NO
Ident. No.: 10E

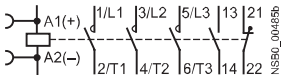


1 NC
01E

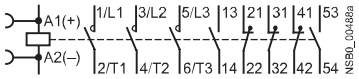


3TF20 10 contactors with 3TX4 4 ..-1 auxiliary switch block,
3TF22 and 3TF29 contactors
with AC and DC operation

1 NO + 1 NC
Ident. No. 11E

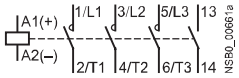


2 NO + 3 NC
Ident. No.: 23E

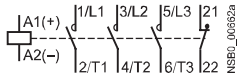


3TF20 ..-3, 3TF20 ...-6 and 3TF20 ..-7 contactors
with AC and DC operation

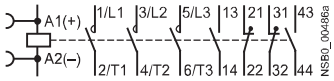
1 NO
Ident. No.: 10E



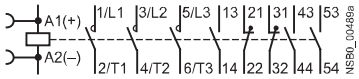
1 NC
01E



2 NO + 2 NC
22E



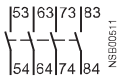
3 NO + 2 NC
32E



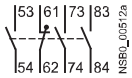
Terminal designations according to EN 50005

3TX4 4 ..-2 auxiliary switch block

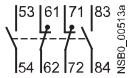
4 NO
Ident. No.: 40



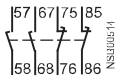
3 NO + 1 NC
31



2 NO + 2 NC
22



2 NO + 2 NC
22U



With make-before-break

2 NO
Ident. No.: 20

1 NO + 1 NC
11

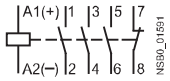
2 NC
02

1 NO + 1 NC
11U

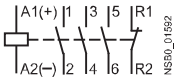
With make-before-break

3TK20 contactors

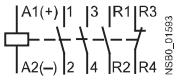
4 NO



3 NO + 1 NC



2 NO + 2 NC



Surge suppressors

Diode

Diode assembly

Varistor

RC elements

Diode with LED

Varistor with LED

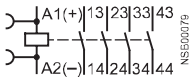
Project planning aids

Internal circuit diagrams for 3TH2 contactor relays and 3TH27 latched contactor relays

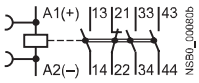
Size S00
Terminal designations according to EN 50011

3TH20 ..-0 contactor relays,
AC and DC operation,
with screw terminals

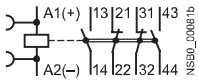
4 NO
Ident. No.: 40E



3 NO + 1 NC
31E

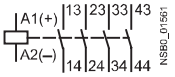


2 NO + 2 NC
22E

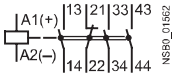


3TH20 ..-3, 3TH20 ..-6, 3TH20 ..-7 contactor relays,
AC and DC operation,
with flat connectors 6.3 mm x 0.8 mm and solder pin connectors

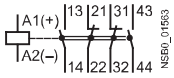
4 NO
Ident. No.: 40E



3 NO + 1 NC
31E

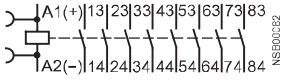


2 NO + 2 NC
22E

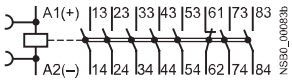


3TH20 40 contactor relays with 3TX4 4 ..-0 auxiliary switch block and
3TH22 contactor relays

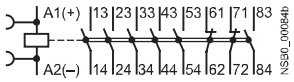
8 NO
Ident. No.: 80E



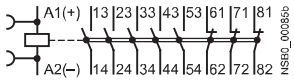
7 NO + 1 NC
71E



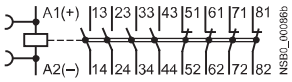
6 NO + 2 NC
62E



5 NO + 3 NC
Ident. No.: 53E

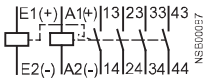


4 NO + 4 NC
44E

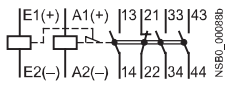


3TH27 latched contactor relays,
AC and DC operation

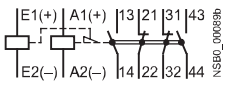
4 NO
Ident. No.: 40E



3 NO + 1 NC
31E



2 NO + 2 NC
22E

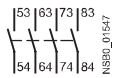


Terminal designations according to EN 50005

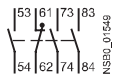
3TX4 4 ..-2 auxiliary switch block

Positively driven operation is assured likewise for auxiliary switch blocks according to EN 50005 in conjunction with 3TH20 contactor relays (basic units).

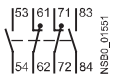
4 NO
Ident. No.: 40



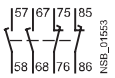
3 NO + 1 NC
31



2 NO + 2 NC
22



2 NO + 2 NC
22U



with make-before-break

2 NO
Ident. No.: 20

1 NO + 1 NC
11

2 NC
02

1 NO + 1 NC
11U

with make-before-break

Surge suppressors

Diode

Diode assembly

Varistor

RC elements

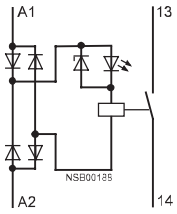
Diode with LED

Varistor with LED

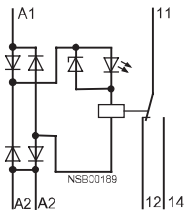
Relay couplers – connection diagrams for 3TX7 002/3

Terminal designations according to EN 50005

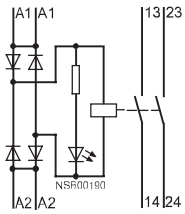
3TX7 002-.A.00
3TX7 002-1AB02
3TX7 002-2AF05
3TX7 003-.A.00



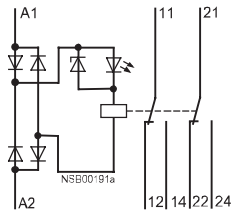
-1B.00



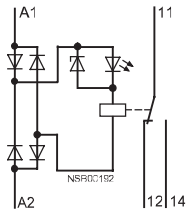
-1CB00



-1FB02



-2BF02

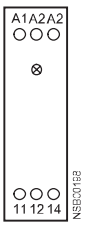


Relay couplers – position of the terminals

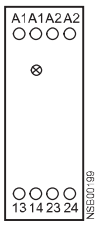
Output coupling links

3TX7 002-1AB0.
3TX7 003-1AB00

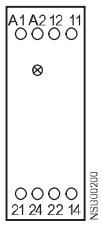
-1B.00
-1B.00



-1CB00
-1CB00



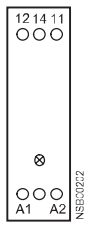
-1FB02



Input coupling links

3TX7 002-2A.0.
3TX7 003-2A.0.

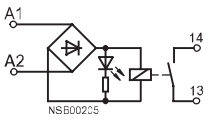
-2BF02



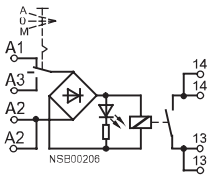
Relay couplers – connection diagrams for 3TX7 004/5

Output coupling links

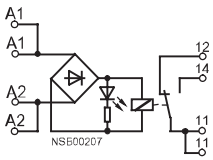
3TX7 00.-1M.00



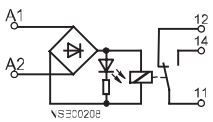
3TX7 00.-1AB10



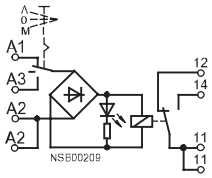
3TX7 00.-1BB00
3TX7 00.-1BF05



3TX7 00.-1L.0.

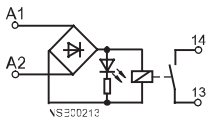


3TX7 00.-1BB10



Input coupling links

3TX7 00.-2M.02



A = Automatic
0 = Neutral position
M = Manual

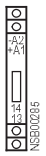
Project planning aids

Relay couplers – position of the terminals

Output coupling links

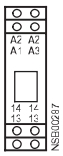
3TX7 004

-1M.00

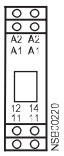


-1L.0.

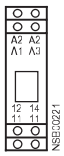
-1AB10



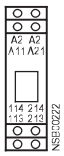
-1B.0.



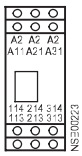
-1BB10



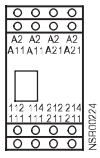
-1CB00



-1HB00



-1GB00



Input coupling links

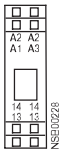
3TX7 004-2M...

3TX7 005

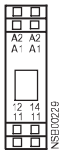
-1M.00

-1L.0.

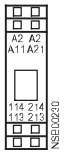
-1AB10



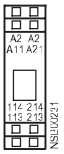
-1BB00



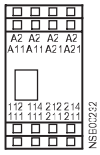
-1BB10



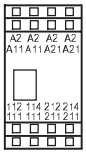
-1CB00



-1HB00



-1GB00

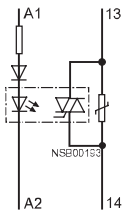


3TX7 005-2M...

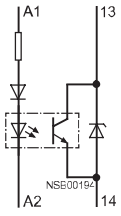
Semiconductor couplers – connection diagrams

Terminal designations according to EN 50005

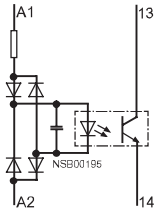
3TX7 002-3AB00



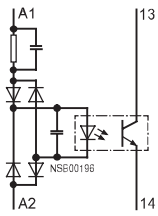
-3AB01



-4AB00



-4AG00



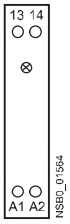
Semiconductor couplers – position of the interfaces

Output coupling links

3TX7 002-3AB0.

Input coupling links

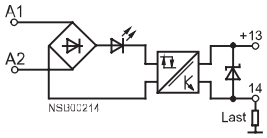
3TX7 002-4A.0.



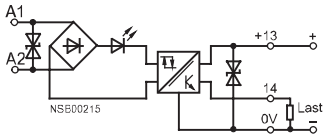
Semiconductor couplers – connection diagrams

Output coupling links

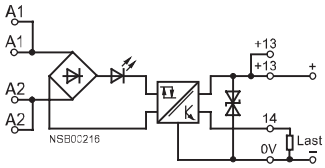
3TX7 00.-3AB04
3TX7 00.-3PB41



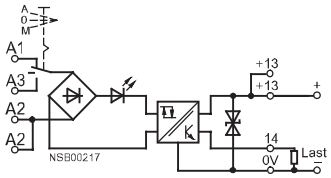
3TX7 00.-3PB54
3TX7 00.-3PG74
3TX7 00.-3PB74



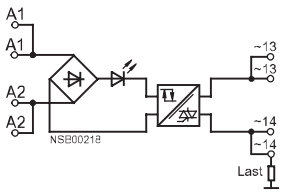
3TX7 00.-3AC04



3TX7 00.-3AC14

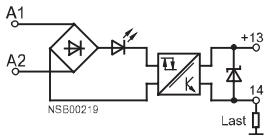


3TX07 00.-3AC03



Input coupling links

3TX7 00.-4AB04

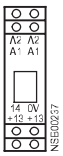
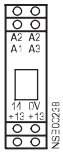
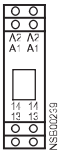


A = Automatic
0 = Neutral position
M = Manual

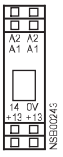
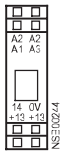
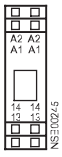
Semiconductor couplers – position of the interfaces

Output coupling links

3TX7 004

-3AB04, -3PB41	-3PB54, -3PB74, -3PG74	-3AC04	-3AC14	-3AC03
				

3TX7 005

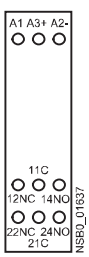
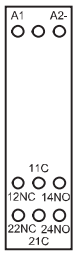
-3AB04, -3PB41	-3PB54, -3PB74, -3PG74	-3AC04	-3AC14	-3AC03
				

Input coupling links

3TX7 004-4AB04

3TX7 005-4AB04

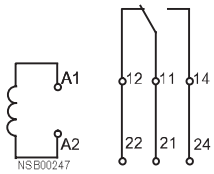
3RS18 coupling relays with industrial housing – position of the terminals

3RS18 00 -.AP00 -.AQ00	3RS18 00 -.BP00 -.BQ00	3RS18 00 -.HP0. -.HQ0.	3RS18 00 -.BW00	3RS18 00 -.HW0.
				

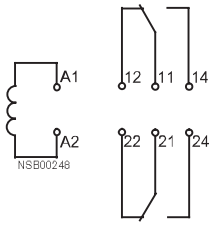
Project planning aids

LZX plug-in relays – relay couplers

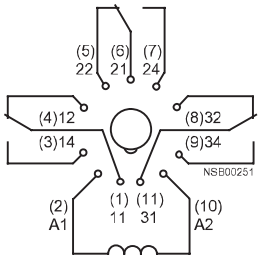
LZX:RT3
1-pole



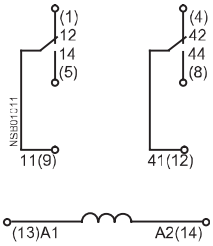
LZX:RT4
2-pole



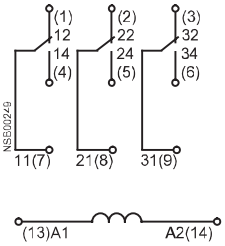
LZX:MT32
3-pole



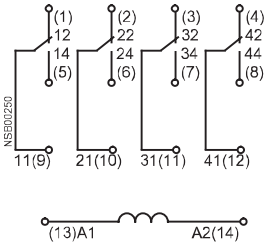
LZX:PT270
2-pole



LZX:PT370
3-pole



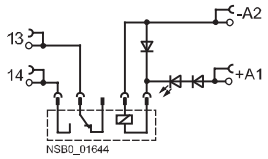
LZX:PT570
4-pole



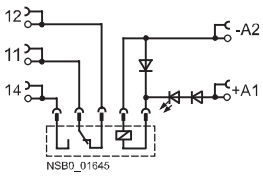
Values in brackets: socket designations.
Without brackets: contact/coil designations.

3TX7 014/3TX7 015 relay couplers with plug-in design – connection diagrams

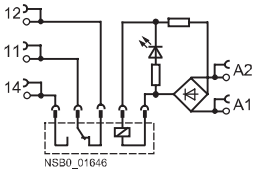
3TX7 01.-1AM00



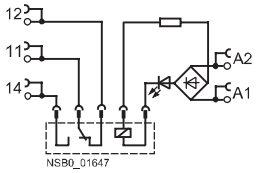
3TX7 01.-1BM0.



3TX7 01.-1BB0.



3TX7 01.-1BE0.
3TX7 01.-1BF0.



3TX7 014/3TX7 015 relay couplers with plug-in design – position of the terminals

3TX7 01.-1AM00

3TX7 01.-1BM0.

3TX7 01.-1BB0.
3TX7 01.-1BE0.
3TX7 01.-1BF0.